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IMPERIAL MYCOLOGICAL INSTITUTE
19 SEP 1944

TROPICAL DISEASES BULLETIN

VOL. 41.] 1944. [No. 7.

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Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.
(Telephone: MUSEUM 3041)

[Price 2/6 Net. *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 41.] 1944. [No. 7.

SUMMARY OF RECENT ABSTRACTS.*

VI. PLAGUE.

Epidemiology: Epizoology: Transmission.

MOLL and O'LEARY (p. 239) give an account of the history of plague in Mexico, where the last outbreak ended in 1923. The preventive measures adopted in Mexico are outlined. The same authors (p. 389) recount also the history of plague in the West Indies.

In the *Bulletin de l'Institut d'Hygiène du Maroc* (p. 604) it is reported that during 1941 there were 1,555 bacteriologically confirmed cases of plague in the region of Agadir. A not uncommon mode of spread is by natives who take goods belonging to a person dead of plague, and, evading inspection by the authorities, introduce the infection into other communities. Plague in Casablanca is connected closely with the grain traffic.

ALONSO MUJICA (p. 774) gives an account of plague in Peru and Ecuador, where the inhabitants, living under primitive conditions, carry on a constant traffic in cuis, which are highly susceptible to plague. These animals have even been known to cause epizootics in distant places to which they have been consigned. Discussing the capture of rats from the point of view of plague, the author enunciates certain rules :—(1) Among rats received at the Institute at Guayaquil, *Rattus norvegicus* usually predominates to the extent of 75 per cent. When the proportion is equal to that of other species it can be affirmed that the total rat population has decreased, a sign of unusual rat mortality. (2) The proportion of female to male rats is usually five to one. If the proportion approaches equality it is a sign of decrease of the total rat population. (3) Freedom of the rats from parasites and other infective diseases is a sign of decrease of the rat population. (4) If plague is found in more than 5 per cent. of trapped rats there is reason for alarm and increased efforts of control. Such observations have proved valuable in demonstrating the existence of rat plague, and in forecasting outbreaks of the disease.

MACCHIAVELLO (p. 909) does not support the current view that the guineapig and its fleas *Rhopalopsyllus cavicola* and *Pulex irritans* play

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1943, v. 40. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

the most important part in human plague in the Andean region of Ecuador. Domestic rats, *R. rattus* and *R. alexandrinus*, have been found throughout these areas, and *X. cheopis* can breed, at least seasonally, up to 9,900 feet above sea level. He holds that rural plague here conforms to the classical rat-flea mechanism, and that the rôle of the guineapig is to act as a reinforcing factor because it is a co-dweller with man, acts as a flea trap, and is extremely susceptible to plague.

Plague last broke out in Venezuela in 1939–40, when a sparsely populated area was affected. The rats of this region are mainly field rats, and the outbreak must be regarded as sylvatic. HECHT (p. 605) found most of the fleas from rodents to be of the genus *Rhopalopsyllus*, but in the city of Caracas, where the rats are chiefly *R. norvegicus*, 95 per cent. of the fleas were *Xenopsylla cheopis*.

ALBERTO ALVARADO (p. 773) refers to the intense epizootic of plague in sylvatic rodents which occurred in northern Argentina, and which led to a severe outbreak in man during 1940. Control measures were instituted and the incidence of human disease declined very greatly during 1941.

In the *Boletin Sanitario* (p. 774) is an account of an investigation into plague in the neighbourhood of Quequen, Argentina. The disease was probably introduced by the grain traffic, and its introduction coincided with the height of the epizootic in rats. There is evidence of the very close association which exists between rats and the sylvatic rodents. For instance, the rat flea *Nosopsyllus fasciatus* was found on cuis, and the cuis themselves were caught in the grain stores of the port.

EVANS *et al.* (p. 696) discuss sylvatic plague in ground squirrels of Kern County, California, where, although intervening surveys were negative, plague was proved in 1934 and 1941. An inapparent infection (possibly a true latent infection) was demonstrated in young squirrels in October 1941. Fleas in the burrows have been known to survive 63 days after experimental infection, and may provide at least a temporary shelter for the bacilli when the rodent host population is low. Plague infection was demonstrated in *Diamanus montanus*, *Hoplopsyllus anomalus* and *Echidnophaga gallinacea*.

PRINCE (p. 775) states that plague has been demonstrated in wild rodents of 12 Western United States. City rats will migrate as much as four miles, and contact between urban rats and sylvatic rodents is possible ; fleas of the latter are now finding their way to rats near the centres of population of coastal towns. In San Francisco infected *R. norvegicus* were found in 1941 for the first time since 1908, and if the infection should spread from wild rodents to urban rats there is the risk of serious outbreaks in man. On the three common rats *R. norvegicus*, *R. rattus* and *R. alexandrinus* there were found 21 species of fleas, the commonest in coastal cities being *X. cheopis*, *Nosopsyllus fasciatus* and *Leptopsylla segnis*. Nine of the species have been proved capable of transmitting plague under experimental conditions, but transmission tests with *L. segnis* were not successful.

SCHWARZ (p. 240) contributes notes on commensal rats, pointing out that the rat usually referred to as *R. rattus alexandrinus* is, in fact, *R. rattus frugivorus*. He describes the distinguishing features between these rats, both of which are found in the United States. The latter tends to nest in trees, and control measures effective against *R. norvegicus*, *R. r. rattus*, and *R. r. alexandrinus* may therefore be

ineffective against *R. r. frugivorus*. Notes are also given of the spread of rats into East Africa.

STEWART (p. 841) sums up present knowledge of the status of vectors of sylvatic plague in N. America, naming some of the fleas most widely distributed on the wild rodents and referring to those fleas which may play a part in transmitting the disease from these rodents to domestic rats. The part played by fleas in transmitting plague from wild rodents to man is not understood, and in a number of cases human infection has been traced to bites by captive wild rodents.

EWING and FOX (p. 841) have issued a classification of the fleas of N. America, with keys to families, subfamilies and genera, but not to species. They note that for many years *X. cheopis* appeared to be confined to large ports, but that since 1925 this flea has been found in a number of inland areas, as far north as Iowa and Minnesota.

DOUGLAS and WHEELER (p. 695) have carried out detailed work on the infection of *Xenopsylla cheopis* and *Diamanus montanus* with *Pasteurella pestis*, and emphasize that the transmission of plague by fleas is absolutely dependent on the multiplication of the organism in the alimentary tract. The faeces of the fleas are probably not important in infection of the mammalian host. In comparing the vector capacity of the two fleas the authors note that many factors are involved.

GIRARD (p. 842) refers to the flea *Synopsyllus fonquernii*, which is found abundantly on insectivorous hedgehogs in Madagascar, and which has been found on *R. r. alexandrinus*. It is capable, experimentally, of becoming infected and of transmitting plague to guineapigs, but it is not known whether it bites man or is liable to become blocked like the known vector fleas.

Aetiology.

BERKMAN (p. 538) defines the criteria of classification of the genus *Pasteurella*, and has investigated the growth requirements of the various species included in this genus. *P. pestis* and *P. pseudotuberculosis* are comparatively easily grown; they develop well in a medium of amino-acids, inorganic salts and glucose, and do not require the accessory growth factors (including various vitamins) necessary for some other species.

DOUDOROFF (p. 775) reports studies on the nutrition and metabolism of *P. pestis*. The original abstract should be consulted for details, but one finding was that very heavy growths could be obtained in synthetic media with glucose and small amounts of cystine and phenylalanine if adequate aeration was provided by constant agitation.

DEVIGNAT (p. 390) describes a method (not new) for the oxygenation of fluid culture media, by means of which greatly increased growth of bacteria (including *P. pestis*) may be obtained. With SCHOETTER (p. 391) he has shown that two highly virulent strains lost their virulence after 30–36 days of cultivation under continuous oxygenation. These strains preserved a high degree of antigenic power, and one was comparable, in protective power for the guineapig, with the well-known E.V. strain.

MACCHIAVELLO and PARACAMPOS (p. 48) have studied the effect of climatic conditions on the viability of *P. pestis* in pathological specimens. Heat, desiccation, putrefaction and variations of humidity

are active factors leading to false negative results in cultivation from such materials. The best practical method of despatch in the tropics is in the form of a culture in which a large piece of the tissue is left in the culture tube. The method of LONG (embedding the tissue in paraffin) is simple and secure, and suspension of the material in glycerine has been used. Cultures on agar or sulphite agar have also been made for transmission to the laboratory.

The same authors (p. 49) have found that *P. pestis* remains viable better in the spleen than in liver tissue, when kept in the icebox. Virulence is progressively lost, however, and although this could often be restored in Chilean strains, the change appeared to be irreversible in some Brazilian strains. On the whole, refrigeration of organs is not recommended as a routine method of preserving the plague bacillus, nor is the procedure of keeping the viscera in glycerine (50 per cent.) at low temperatures.

The authors show that living bacilli could still be recovered from cultures on solid media after being kept for 284 days at laboratory temperature, even when the media were apparently quite dry. The addition of blood to the media notably protected viability and virulence. In fluid cultures the concentration of toxic substances, metabolic or mineral, influenced viability. The authors conclude that it is preferable to send material for diagnosis in the form of cultures instead of in the form of tissues or viscera.

If stab cultures of *P. pestis* are covered with 1–2 cc. of paraffin oil the viability of the organisms is greatly increased (for several years), whether the cultures are kept at room temperature or under optimum conditions. Virulence, under these conditions, is diminished more than in cultures preserved in the icebox.

MACCHIAVELLO (p. 46) has shown that strains of *Pasteurella pestis* isolated from man, rat and flea in Brazil do not differ from each other or from strains from other parts of the world. Strains recovered from cold inguinal buboes (*ingua de frio*), from which isolation is usually difficult, do not possess characteristics which would justify their being regarded as a special race. This condition is regarded as an attenuated form of bubonic plague.

MACCHIAVELLO (p. 47) has made a study of colony variation, toxicity and biochemical reactions of *P. pestis* recovered from the various types of plague in man, rodents and fleas. Morphological variations in colonies are not always accompanied by changes in biochemical properties, and effectiveness of dissociation is not to be judged from the superficial smooth or wrinkled aspect of a culture. It is the granular or homogeneous internal structure of a colony, not its surface appearance, which is important as an index of virulence. Homogeneous colonies, finely granular and also virulent, are unstable; the coarsely granular and avirulent are stable. The smooth antigen is an antigen of the deep structure, and does not influence the colony morphology.

MACCHIAVELLO (p. 48) describes two strains, one from a human gland and one from a rat, which he regards as true stable mutations from the normal type; the evidence on which this opinion is based includes morphological, biochemical and serological tests.

PONS (p. 776) notes that a cocco-bacillus resembling *P. pestis* has been isolated from an apparently healthy rat; this was identified as a species previously isolated from rodents with pseudo-tuberculosis. It might lead to error in the diagnosis of rodent plague.

Pathology: Clinical Findings: Treatment.

HENNESSEY (p. 240) points out that pathologists who rely on the classical appearances of bronchopneumonia in making a diagnosis of plague pneumonia may fall into error. He states that in 38 autopsies on patients dying of primary plague pneumonia the condition was true lobar pneumonia. As fulminating plague usually kills the patient before the stage of red hepatization has been passed, the occurrence of advanced lesions of the lobar type is an indication that the strains of *P. pestis* in this part of Kenya are of reduced virulence.

JUNIOR (p. 50) uses for diagnosis an intradermal test for which the antigen is prepared from a guineapig primary bubo boiled in saline, ground in saline in the proportion 1 gm. to 20 cc., and filtered through gauze. Phenol (0·5 per cent.) is added and the dose is 0·1 cc.

POLLITZER and LI (p. 776) recount an investigation of an outbreak of primary pneumonic plague in which they noticed that as the disease spread the symptoms changed, and that the number of patients with bloody, frothy sputum decreased. This type of sputum is the chief vehicle of spread, and they found that infection never resulted from contact with a patient who had neither bloody sputum nor cough.

CLARK and GOLDBERG (p. 605) report an outbreak of 11 cases of pneumonic plague in South Africa; one of the patients recovered. This woman had been given an injection of live avirulent vaccine, and of anti-plague serum, five days before her illness developed, because she was a contact of another case. She was treated with large doses of serum, to a total of 400–500 cc. Control measures in this outbreak included the use of avirulent live vaccine and serum; the vaccine gave little trouble.

SAVINO and VILLAZÓN (p. 306) have tested sulphanilamide, sulphapyridine and sulphathiazole in experimental plague in guineapigs. The drugs were used in suspensions of 30 per cent. in 20 per cent. gum arabic; only sulphanilamide was given orally, and it was ineffective. Both sulphapyridine and sulphathiazole were superior to sulphanilamide in protective power; the latter, in doses of 0·5 and 1·5 gm. did not protect against one minimum lethal dose, whereas the two former drugs protected against 10,000 minimum lethal doses. Some animals, previously treated and then inoculated with *P. pestis*, developed bubonic or latent infection. BURGA SAAVEDRA (p. 306) reports two cases of bubonic plague successfully treated with sulphathiazole. One also received an injection of serum.

Remarking on the low incidence of plague in Argentina during 1941, COSSIO (p. 773) notes that the case mortality rate was also low (60 per cent. as against the usual 90 per cent.). This is attributed to the use of sulphonamides in treatment, but unfortunately no details of the drugs are given.

In a note on an outbreak of 10 cases of plague in Haifa (p. 538) it is stated that the patients were treated with sulphapyridine; there were no deaths. Vaccination was reserved for contacts. The outbreak in man was preceded by infection in rats, and an infected rodent was found, in routine examination of the port area, two months before the first human case occurred. Measures against rats included trapping and demolition of rat harbourages.

Vaccination: Control.

GIRARD and ROBIC (p. 777) have brought their observations on plague in Madagascar up to 1941, and refer especially to the great

decline in incidence which has coincided with the use of the live, attenuated, E.V. vaccine since 1933–34. During this time there has been no change in the flea fauna of rats.

VINCKE and JANSSENS (p. 391) have tested the efficacy of vaccination with the living E.V. vaccine (which had been maintained in the Belgian Congo for a year), as a protection against three virulent strains of *P. pestis* isolated locally. With vaccine doses of 2,000 million to 1,000 organisms, immunity against standard lethal doses was conferred in 97 per cent. of the series of guineapigs, whereas with Haffkine's vaccine the figure was only 12·5 per cent. The advantage of live vaccine appears to justify its use, and since this experimental work was done some thousands of vaccinations have been performed by the authors in man, without difficulty or inconvenience.

STEWART (p. 306) has found that carbon disulphide is highly efficient in killing rodents (such as the ground squirrel) in their burrows, and is less toxic to man, and cheaper, than methyl bromide, though it has the disadvantage of being explosive. Carbon disulphide cannot, however, be relied upon to kill fleas except in concentrations which render it more expensive to use than methyl bromide, which is a more efficient killing agent.

SHERRARD (p. 842) has elaborated a plan for rodent control in cities, which includes a course of training for the staff. Control procedures should be permanent, and comprise rat-proofing, elimination of accumulations of waste material, proper storage of goods, trapping, fumigation and poisoning. *Charles Wilcocks.*

MALARIA.

SHUTE, P. G. **Indigenous Malaria and Mosquito Control in England after the War.** *J. Roy. San. Inst.* 1944, Apr., v. 64, No. 2, 85–93, 5 figs.

The author recalls the return to England of large numbers of men infected with malaria during and after the war of 1914–18, and the more than 600 cases of malaria contracted in England to which they gave rise. All but one were *P. vivax* infections. Such an experience is likely to be repeated. Of the four species of *Anopheles* that occur in England, *A. algeriensis*, *A. claviger*, *A. plumbeus*, *A. maculipennis*, only the last is likely to be of any importance as a vector. Two races of *A. maculipennis* occur, *messeae* and *atroparvus*. *A. m. messeae* prefers domestic animals to man; *A. m. atroparvus* is apparently the only efficient vector. It breeds in brackish water—a fact that may explain why 90 per cent. of the indigenous infections occurred near the coast, notably in Essex and Kent where *A. m. atroparvus* appears to be much more numerous than elsewhere. The transmission season is short, June to September. The most efficient measures of control are likely to be the thorough treatment of malaria patients, spray-killing adult *Anopheles* in and near infected premises, and anti-larval measures where circumstances permit. *Norman White.*

British Guiana Med. Ann. 1943, 161–8. **Report on the Activities of the Malaria Investigations Service of the Medical Department, British Guiana, for the Year 1942.**

The Malaria Investigations Service, organized in 1939 to investigate the malaria problems of British Guiana, is supported by the Government, the Sugar Producers' Association and the Rockefeller Foundation.

Over 90 per cent. of the population of the Colony live in a coastal belt 5 to 15 miles wide, much of which is below high tide level. The work of the Service to date had been largely concerned with the study of the habits of coastal anophelines. The species are *A. darlingi*, *A. albitarsis*, *A. triannulatus* and *A. "tarsimaculatus."* *A. "tarsimaculatus"* probably includes *A. aquasalis* and *A. oswaldoi*, and possibly others. *A. darlingi* is the chief vector.

British Guiana experienced a drought of 33 months from September 1938 to June 1941, the effects of which were noticeable till the end of 1942. Anophelines became scarce; *A. darlingi* disappeared about April 1940. It reappeared in June 1941 but for a time its distribution was very limited and it only spread rapidly toward the close of 1942. The drought did not dry up breeding places; there was at all times an abundance of water, much of which appeared to be favourable to mosquito breeding, but there were chemical and perhaps biological changes in many waters. The malaria incidence was lessened, but increased again in 1942.

Of 11,687 adult anophelines identified in 1942, 90·8 per cent. were *A. darlingi*, 7·7 per cent. *A. "tarsimaculatus,"* 1 per cent. *A. albitarsis*, and 0·5 per cent. *A. triannulatus*.

Of 6,849 larvae identified, 73·4 per cent. were A. *"tarsimaculatus"* and only 6·1 per cent. *A. darlingi*. Larvae of *A. darlingi* are apt to be scattered widely and are rarely abundant in any single breeding place; the adults frequent dwelling houses and remain there many hours after taking a blood meal.

Of 817 adult female *A. darlingi* dissected, 10 had sporocysts on the stomach and 8 had sporozoites in the salivary glands. No infection was found in 41 *A. "tarsimaculatus"* and 2 *A. albitarsis* dissected. *A. albitarsis* is an important vector in Brazil but in British Guiana it rarely enters houses. There was some evidence that *A. "tarsimaculatus"* was responsible for malaria transmission in Georgetown and elsewhere, but *A. darlingi* is by far the most important vector.

The spray-killing of adult anophelines is to be tried as a measure of malaria control; it should be of great value against a house haunting species such as *A. darlingi*. The application of drainage methods of malaria control has very limited possibilities in the colony.

No anophelines breed in the bromeliads of British Guiana.

Norman White.

Schwetz, J. Considérations sur les variétés morphologiques des trophozoites de *Plasmodium falciparum* signalées en Afrique intertropicale. [**Morphological Varieties of Trophozoites of *P. falciparum*.**] *Ann. Soc. Belge de Méd. Trop.* 1943, Mar. 31, v. 23, No. 1, 47–62.

The author discusses the variations which have been described in the form of parasite in benign tertian and malignant malarial infections,

some of them considered by certain observers as justifying the establishment of distinct species. In the case of the benign tertian parasite, a form which was considered to be a variety of this is now generally recognized as a distinct species, *Plasmodium ovale.* It is in the case of the malignant parasites that variations have been chiefly regarded as of specific value. Thus ZIEMANN many years ago proposed to establish a new species *P. perniciosum,* and more recently RAFFAELE and LEGA have attempted to create a new species *P. aethiopicum.* Another variation was described by STEPHENS under the name *P. tenue.* The author points out that in a country where malaria is endemic there are many circumstances which may influence the appearance of the parasites in the blood. Young children may have heavy infections with or without symptoms. The parasites are in the form of minute rings. In older children or adults with varying degrees of immunity parasites may still be present in the blood. Such individuals may be ill with fever from some cause other than malaria, and it may erroneously be supposed that the febrile condition is caused by malarial parasites in the blood, which are usually large, and which differ according to the actual stage of development they have reached. Again, Europeans who have not developed immunity may suffer from malarial attacks. The form of the parasite is dependent again on varying factors associated with the making of the blood films. The appearance in thick films is very different from that in thin films, while the difference in the time taken to dry thin films in a hot, dry atmosphere and in one that is humid is responsible for variations in the character of the parasites. For the author the only conclusion that can be drawn is that the presence of numerous very young rings in non-immunes is an indication that the febrile attack is due to malaria, while the presence of older forms in immune individuals means that the attack may be due to some other febrile illness in a malaria carrier. This conclusion appears to the author to be the reverse of that drawn recently by BOURGUIGNON, writing from Elisabethville, who, it would seem, has based his arguments on insufficient evidence [see this *Bulletin,* 1943, v. 40, 103]. *C. M. Wenyon.*

MATILLA, V. & APARICIO, J. Las formas " libres " de los parasitos en el paludismo humano. [**" Free " Parasite Forms in Human Malaria.**] *Med. Colonial.* Madrid. 1943, Jan. 1, v. 1, No. 1, 7–28, 7 figs. [69 refs.]

Study of the bone marrow in cases of general paralysis undergoing malaria therapy has enabled the authors to demonstrate the constant presence of extracellular malarial parasites. The majority of these are devoid of pigment, but on rare occasions free pigmented forms are met with. It is concluded that the free pigmented forms are partially developed erythrocytic parasites which, finding their way to the bone marrow in the blood supply to this tissue, have been liberated through digestion of the containing erythrocyte. The free parasites devoid of pigment are regarded as belonging to the exoerythrocytic or histiocyte cycle of development, which is initiated directly from the sporozoites. The discovery of these free forms in the marrow has been used by the authors as a text for a lengthy review of recent work on the exoerythrocytic development of malarial parasites in general, and various

speculations regarding the course of malarial infections, the reasons for relapses, and the difficulties of effecting a cure by antimalarial drugs.

C. M. Wenyon.

KNOWLES, R. & BASU, B. C. **Laboratory Studies on the Infectivity of** *Anopheles stephensi. J. Malaria Inst. of India.* 1943, June, v. 5, No. 1, 1–29, 2 figs. [14 refs.]

BASU, B. C. **Laboratory Studies on the Infectivity of** *Anopheles annularis. Ibid.*, 31–51.

The experiments recorded in the first of these papers were commenced in 1931 according to a plan drawn up by the senior author, whose untimely death left to his co-worker the duty of drawing up the report. The object of the investigation was to study the effect of temperature and humidity on the susceptibility to infection with the three common species of human malarial parasite of the mosquito *Anopheles stephensi.* A specially constructed cabinet was employed, in which the temperature and relative humidity could be maintained at levels which varied only 2°F. as regards temperature, and 2 per cent. as regards relative humidity. The mosquitoes, after being fed on gametocyte carriers, were placed in cages, and the cages were immediately transferred to the cabinet, which was set for the desired combination of temperature and humidity.

The general results, which are given in a series of tables, indicate that temperature appears to be a more important factor in the transmission of malaria by *A. stephensi* than atmospheric humidity. The length of life of the mosquitoes is increased as the temperature falls, provided the percentage of humidity is high. Spring and hot weather conditions in Calcutta, as reproduced in the cabinet, are the most suitable for gut and gland infections. Heavy experimental infections were observed under conditions simulating those of the monsoon, post-monsoon and cold weather periods in the city. This is in agreement with the findings that in April and May in Calcutta infected mosquitoes are rarely found. At 50°F., with humidities between 50 and 100 per cent., infections were not obtained, while at 100°F., with the same humidity, mosquitoes did not survive long enough to become infected. Infection with *Plasmodium vivax* occurred at temperatures between 60°F. and 90°F., the heaviest salivary gland infection being obtained at 80°F. The complete development up to sporozoites took 18 days at 60°F., 15 days at 70°F., 11 days at 80°F. and 9 days at 90°F. Infections with *P. falciparum* occurred at temperatures of 70°F. to 90°F., the complete development taking 14 days at 70°F., 10 days at 80°F. and 9 days at 90°F. The experiments with *P. malariae* were less extensive, owing to the difficulty of securing satisfactory gametocyte carriers. Good infections occurred between 70°F. and 80°F., and scanty infections between 80°F. and 90°F. No salivary gland infections were observed, possibly owing to the mosquitoes having been dissected too soon. On all these results the maturity and numerical density of the gametocytes in the blood had an important bearing.

In the second of these papers experiments similar to those recorded in the first are described for *Anopheles annularis.* The results with *P. vivax* and *P. falciparum* were almost identical, but with *P. malariae* the results were inconclusive. With the two former species of plasmodium the results closely resembled those obtained with *A. stephensi.*

C. M. Wenyon.

JONES, J. W., Jr. **Observations and Suggestions concerning some Factors related to Malaria Mosquito Surveys.** *J. Tennessee Acad. Sci.* 1943, v. 18, No. 4, 298–304, 1 graph. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Mar., v. 32, Pt. 3, 60.]

It is the practice in the Mississippi valley to estimate the rate of production of *Anopheles quadrimaculatus*, Say, from breeding places and the consequent need for measures against the larvae from the numbers of adults found in neighbouring buildings that provide shelter for them during the day. The author has found, however, that some of the "collecting stations" chosen do not provide comparable data because they are inspected without regard to physical variables. This is particularly true of buildings with metal roofs, as they provide shelter early in the morning but become so hot and dry as the day advances that the mosquitos are forced to leave them. He has also found that the mosquitos may remain in a particularly favourable shelter for so long a time that their abundance may not indicate very recent production from a breeding place. In one instance a swamp was treated when the number of mosquitos in a neighbouring collecting station rose to 3,000. Dipping records indicated that the treatment had reduced the numbers of larvae by 92 per cent., but it was continued for a further two weeks as there was no reduction in the numbers of mosquitos in the station. It might have been continued indefinitely had not the resident mosquito population of the station been eliminated by spraying when the daily counts had shown the presence of over 3,000 for 24 consecutive days. The counts after spraying varied from 0 to 46 for 11 days and showed no appreciable rise for several weeks.

Another station in which the mosquito population had been over 300 for over a month contained 482 females of *A. quadrimaculatus* on 5th July. On that day, 428 were caught and stained and 400 of these were returned to the shelter. A sample of 200 mosquitos was caught in it on 23rd July and 124 of them showed the stain, indicating that 62 per cent. of the population had been in it for 18 days. Another stained individual was recovered on 9th August, which showed that a female can survive for at least 35 days in nature. In view of these observations, the author suggests that the proper method to adopt in the use of counting stations is to destroy all mosquitos by spraying after each count is made.

On the basis of observations at a reservoir in Mississippi, the author also draws attention to the effect of water fluctuation on the breeding of *A. quadrimaculatus*. A rise of three inches converts a large area of grassland into a marsh favourable for breeding, but a further rise covers the grass so that this area is subject to wave action, while it produces another favourable marsh at a higher level. A reverse sequence results as the water falls, and, in general, a given area remains favourable for not longer than the time required for the development of a single brood.

HIXSON, H. **Data and Observations on the Natural Reduction of *Anopheles* Mosquito Larvae in certain Environments.** *Florida Entomologist.* 1943, v. 26, No. 2, 17–24. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Mar., v. 32, Pt. 3, 60–61.]

The studies described were carried out in 1938–39 in a small lake and a shaded permanent pond in Florida, the flora and fauna of which

are described. *Anopheles quadrimaculatus*, Say, and *A. crucians*, Wied., were present in both collections from the pond in May 1939, when the temperature of the water was 25–26°C. [77–78·8°F.] and mosquitos and predators were scarce. The numbers of mosquito larvae in the first, second, third and fourth instars and of pupae were 12, 17, 24, 31 and 8, the differences corresponding to the times required to complete the successive stages. Collections in August, when the temperature of the water was 25–27·5°C. [77–81·5°F.] and Anopheline larvae were numerous, showed a decrease of 81 per cent. between the first and fourth instars. This is attributed to the effectiveness of abundant larvae of Hydrophilid beetles (*Tropisternus* spp.) in the absence of minnows. The biotic potential of the Anophelines was, however, high enough to ensure that a considerable number of mosquitos reached the pupal stage. The fauna in the lake included minnows (*Gambusia affinis* and *Heterandria formosa*) in abundance and larvae of *Tropisternus* and other predators in comparatively small numbers. In December 1938 and January 1939, when the water temperature was 17–18°C. [62·6–64·4°F.], a decrease of only 19 per cent. occurred between the first and fourth instars and many individuals completed development. In the middle of April, when the minnow population had increased considerably and the water temperature was 28–29°C. [82·4–84·2°F.], a decline of at least 40 per cent. between the first and fourth instars was indicated, but the pupal incidence showed that a considerable number of mosquitos could still complete development. By May, when the minnow population had reached its height and water temperature was 24–34°C. [75·2–93·2°F.], there was a reduction of about 87 per cent. during larval development and the numbers reaching the adult stage were insignificant. From the middle of June to the end of August, very few Anopheline larvae were found, probably on account of the high water temperatures, which ranged up to 38°C. [100·4°F.].

This study indicates that *G. affinis* is a dominating species. Its effectiveness increased with the size of the mosquito larvae, but depended, in the presence of protective vegetation, on the activity of other aquatic life. The efficiency of *Tropisternus* is not affected by the size of its prey and depends on the Anophelines' habit of remaining immobile in contact with vegetation or other floating matter.

DHAYAGUDE, R. G. & PURANDARE, N. M. **Autopsy Study of Cerebral Malaria with special reference to Malarial Granuloma.** *Arch. Pathology.* 1943, Dec., v. 36, No. 6, 550–58, 2 figs.

At the King Edward VII Memorial Hospital, Bombay, autopsies were performed on 97 patients with malaria, in the course of 15 years. Of these, malaria parasites were found in the capillaries of the brain in 55, and these form the subject of this study. All ages from 5 to 60 years were represented, but the commonest group was that aged 21–40; males predominated. The main clinical manifestations were fever and coma, often with signs suggesting meningitis; in seven cases there was no fever, but these patients were collapsed on admission and died shortly afterwards. In many cases parasites were not found in the peripheral blood. Clinical diagnoses recorded in 18 patients included tuberculous or other meningitis, pneumonia, gastro-enteritis, typhoid or dysentery, septicaemia and uraemia.

In 33 cases the species of parasite was determined :—*P. falciparum* 25, *P. vivax* 7, mixed 1.

The liver commonly showed cloudy swelling, pigmentation, and parasites in the Kupffer cells ; parasites were found in the capillaries of the kidneys. In the lungs bronchopneumonia was present in 12 cases. The brain was abnormal to the naked eye in 43 cases, showing slaty colouration, engorgement of vessels, haemorrhages, thrombosis or oedema [only one of these conditions is noted in each case ; it would have been expected that some brains would show several of these features].

Histological examination of the brains showed capillaries filled with parasites and pigment in all cases ; in 17 there was greater damage to the brain substance. Two of these had minute punctiform haemorrhages, in five there were subcortical areas of focal necrosis (consisting of central occluded capillary, surrounded by a zone of necrosis which was itself enclosed in a zone of extravasated red cells). In the remaining 10 malarial granulomata were present, the characteristics of which are a central occluded capillary containing parasitized red cells and having swollen endothelial cells ; a zone of necrotic tissue around this vessel ; a zone, further out, of extravasated red cells in which there are proliferating neuroglial cells with an occasional microglial element. In some cases the proliferating cells form a ring between the necrotic zone and the mass of extravasated corpuscles. Older granulomata do not show these zones, but have a mass of glial nuclei round the central capillary ; this last form has a characteristic appearance.

It is noted that the number of lesions in different parts of the same brain varied considerably, and that all types of lesion might be present at the same time ; all these changes were limited to the subcortical region, the cortex showing only engorged capillaries containing parasitized red cells. During one severe epidemic of malaria, few granulomata were found in the brains ; the explanation offered is that during an epidemic the patients who die do so quickly, before granulomata can develop.

It is evident that *P. falciparum* (and also *P. vivax*) can produce severe cerebral damage ; the parasitized cells tend to agglutinate and to adhere to the vessel wall, the endothelial cells proliferate, and thrombosis occurs. Diapedesis of red cells takes place and focal necrosis occurs. If the patient recovers the neuroglia proliferates and microglial cells invade the field. The end result is a patch of sclerosis, and multiple areas of sclerosis may well produce disturbance of cerebral function ; it is easy to imagine these lesions as the basis for the disturbances usually known as malarial psychoses.

In seven cases the only parasite found (in spleen smears) was *P. vivax* and presumably this parasite was responsible for the cerebral mischief. [Reference may here be made to the acute, hypertoxic, cerebral form of malaria attributed in Russia to *P. vivax*, see this *Bulletin*, 1943, v. 40, 436, 668.] It is again emphasized that the diagnosis of cerebral malaria should not be ruled out on the ground that parasites have not been found in the peripheral blood.

The authors discuss the question whether the changes mentioned are to be explained on a basis of disturbance of circulation due to capillary blockage, or whether a toxin is involved, and refer to the possible rôle of haematin [which DEVINE and FULTON (this *Bulletin*, 1942, v. 39, 438) failed to distinguish from the pigment produced by *P. knowlesi*].

The work of ANDERSON and MORRISON [this *Bulletin*, 1942, v. 39, 741] on this subject is quoted.

[The subject of intravascular agglutination in malaria is discussed by KNISELY and his colleagues (this *Bulletin*, 1943, v. 40, 584) and by LACK (*ibid.*, 676).] *Charles Wilcocks.*

BENJAMIN, H. B. **Staining Method for the Determination of Malarial Parasites.** *Hosp. Corps. Quarterly* (*Suppl. to U.S. Nav. Med. Bull.*). 1944, Jan., v. 17, No. 1, 60–61.

The following method is not intended for the diagnosis of species of malarial parasites but for the detection of very scanty infections. The procedure is as follows.

1. Add 3 cc. of a 1 per cent. aqueous solution of acetic acid to 1 cc. of blood, shake and stand for 3 minutes, then centrifuge at 20,000 r.p.m.
2. Decant, resuspend the deposit in 4 cc. of normal saline and again centrifuge.
3. Repeat 2 until the supernatant liquid is clear, then decant and make a film of the deposit with a wire loop ; stain with Giemsa's stain.

J. F. Corson.

OGANESOV, L. A., SADOYAN, V. S., ISTAMANIAN, L. S., EGNARIAN, V. I. & KARAPETIAN, R. N. **Contribution to the Clinical Classification of Malarial Diseases.** *Klinicheskaya Meditsina* [=*Clinical Medicine*]. Moscow. 1942, v. 20, No. 5–6, 74–8. [In Russian.]

After a critical review of previous methods of clinical classification o malaria the authors propose one which has been devised by them at the Erevan Tropical Institute and is employed in the hospitals of Erevan. This classification, which is based on the clinico-diagnostic principle, supplemented by parasitological diagnosis, is set out in tabular form as follows :—

Clinical Diagnosis	*Symptomatology*
I. *Pre-morbid form* (represented by symptomless parasite-carriers as well as cases in the incubation period)	
II. *Primary malaria.* 1. Primary attack of fever 2. Congenital malaria 3. Induced malaria 4. Reinfection	(*a*) Fever attack.
III. *Protracted malaria.* 1. Relapse form (including relapses due to insufficient treatment, diminished immunity and provocation) 2. Atypical form (cardiovascular, renal, hepato-lienal, masked, etc.) 3. Inter-relapse form [including premunition]	(*b*) Less characteristic or complicated forms (comatose, biliary, haemoglobinuric etc.)
IV. *Meta-malarial disorders* (comprising the terminal forms of malaria) characterized by changes arising after the termination of infection	Meta-malarial nephritis, cirrhosis of the liver, cachexia, etc.

The parasitological findings, if available, should be noted before the symptomatological characteristics. *C. A. Hoare.*

MOST, H. & MELENEY, H. E. **Falciparum Malaria. The Importance of Early Diagnosis and Adequate Treatment.** *J. Amer. Med. Ass.* 1944, Jan. 8, v. 124, No. 2, 71–6.

A large number of American civilians who have been working in tropical countries where *P. falciparum* malaria is endemic return to America, and some fall ill with malaria after their return. Doctors who are unfamiliar with the varied clinical picture which *falciparum* malaria may assume fail to recognize the nature of the illness ; specific treatment is delayed, sometimes with fatal results. Such considerations prompted this paper. Eight cases illustrative of the difficulties in diagnosis that may arise are described. Clinically malaria should be suspected in every patient who has recently returned from the tropics, whatever his symptoms. Fever may be absent even in overwhelming infections. It is impossible to present a clinical description of malaria that will cover all its manifestations. Every passenger and crew member of an airplane returning from a malarious region should be instructed to obtain medical attention on the first development of any symptoms of illness, even those of a common cold, and be informed that he should have his blood examined for malaria by a physician if he fall sick. Thick and thin blood smears should be examined. If the first results be negative, blood examinations should be repeated every 12 to 24 hours until malaria is confirmed or excluded. In suspected cases specific treatment should not be delayed pending microscopic confirmation of diagnosis. The symptoms of onset are most frequently mistaken for infections of the upper respiratory tract or for various gastro-intestinal disorders.

For the treatment of uncomplicated cases atabrine by mouth is recommended. If there be high parasite density or evidence of visceral localization atabrine should be given intramuscularly or quinine intravenously : this should be continued till improvement warrants changing to treatment by mouth. In cerebral cases quinine dihydrochloride with dextrose solution and isotonic saline should be given intravenously every four hours ; nicotinic acid intravenously is also recommended in these cases, to produce dilatation of cerebral capillaries. Spinal drainage may be useful in restoring consciousness. The Surgeon General's Circular Letter on the treatment of malaria is referred to with approbation [this *Bulletin*, 1944, v. 41, 96–7].

Norman White.

STIRK, E. M. **Pulmonary Signs in Malaria.** *J. Roy. Nav. Med. Serv.* 1943, Oct., v. 29, No. 4, 272–4.

The author writes of his experience when working in R.N.S.Q. in an area in which malaria, sandfly fever and respiratory infections are alike common. He gives clinical notes of four cases of benign tertian and one of mixed benign tertian and subtertian malaria in which there were signs of bronchitis or incipient pneumonia. About ten per cent. of malaria cases in the area present some sign of lung involvement. It is thought that high atmospheric temperatures in the hot months (maximum temperatures from 106 to 110°F., minimum 73·8 to 82°F.) and the debilitating effects of previous attacks of malaria and sandfly fever may contribute to this high incidence of chest complications.

Similar manifestations have been noted in cases of sandfly fever in the late summer and early autumn. It is noted that sulphapyridine and quinine have been given concurrently in several cases without ill effect. *Norman White.*

RAVEN, R. W. **The Surgical Aspects of Malaria.** *J. Roy. Army Med. Corps.* 1944, Feb., v. 82, No. 2, 92–6.

This is a study of malaria from the point of view of an officer in charge of a surgical division of a military hospital in North Africa. Bodily injury may precipitate an attack of malaria in persons who apparently enjoy good health at the time of injury, in spite of their having taken antimalaria drugs regularly. Illustrative examples are given. Patients in hospital on account of fractures, bruises, burns and gunshot wounds developed malaria during their stay. Other patients developed clinical malaria as a result of operation. Malaria may lessen resistance to infection and retard the healing process. [It may also be a cause of failure in skin grafting, see this *Bulletin*, 1942, v. 39, 517].

A short description is given of the abdominal symptoms which may be caused by malaria infection and simulate conditions calling for surgical interference. [These have been frequently described.] The existence of malaria does not of course exclude the possibility of there being also an acute intraperitoneal lesion. The author has operated upon two patients who had both malaria and appendicitis; the appendix was gangrenous in one case. A description is given of a case of spontaneous rupture of the spleen in malaria. *Norman White.*

NELSON-JONES, A. **Malignant Malaria on the Gold Coast: some Clinical Notes.** *Ann. Trop. Med. & Parasit.* 1944, Apr. 19, v. 38, No. 1, 1–20, 16 charts.

This description of malignant tertian malaria on the Gold Coast is based on 2,000 cases seen in one year among members of the white Service personnel between 19 and 45 years of age. As in nearly all descriptions of this form of malaria emphasis is laid on the protean nature of the symptoms to which infection with *Plasmodium falciparum* may give rise. The cases described are illustrative of this. "Full differential diagnosis involves almost the whole of medicine." A negative blood film does not exclude malaria, even in severe cases. A patient should never be allowed to die of untreated malaria because the disease appeared in an atypical form and no parasites were discovered on blood examination. Aids to diagnosis in these difficult cases are well described. Sternal puncture is useful, but is "too painful to be popular."

The first principle of treatment is to establish ascendancy over the infection as rapidly as possible, with quinine or mepacrine. The author decries the tendency to restrict treatment to the short courses advocated by the Malaria Commission of the League of Nations. He believes this to be the cause of much chronic ill-health on the West Coast of Africa at the present time. It was common to find men who had had a short course of treatment complain, several days or weeks after its completion, that they had had headaches and slight shivering attacks or sweating. A study of the case records of R.A.F. personnel enabled an appraisement to be made of the relative efficacy of the three main

treatments of the average case which the men had received at other hospitals. These were: (1) Quinine 30 grains a day for seven days followed by plasmoquine [pamaquin] 0·03 gm. a day for three days. (2) Quinine 30 grains a day for two days, then quinacrine [mepacrine] 0·3 gm. daily for five days, then, after an interval of a few days, plasmoquine 0·03 gm. daily for three days. (3) Quinine 30 grains daily for seven days followed by quinine 20 grains daily for another seven days. The third treatment was by far the best. Men had more fully regained their vigour and far less often developed progressive ill-health.

Plasmoquine may reduce the relapse rate of *P. vivax* and *P. malariae* infections, but there is no evidence that it does so to any great extent in *P. falciparum* infections on the Gold Coast. To destroy gametocytes in the blood of Europeans, when the surrounding African population is so rich a reservoir of infection, is insufficient justification for giving so toxic a drug to Europeans as a routine measure. The author would like to see the practice discontinued and further research made for a really effective anti-relapse drug.

Rest in bed is desirable for a week in every case, and no man should return to work until he feels and looks well after being up and about all day. As a rule, air-pilots should not fly within three weeks of the commencement of treatment.

The only fatalities in the series reported were in two cases of blackwater fever and one of cerebral malaria. *Norman White.*

GILLETT, J. A. **Treatment of Cerebral Malaria.** [Correspondence.] *Brit. Med. J.* 1944, Apr. 8, 505–6.

This is a short note describing what appears to be a useful procedure. Four cases of cerebral malaria, all of violent maniacal type, were treated each by one intravenous injection of sodium pentothal in the same doses as are used for surgical purposes. The effect was to induce deep, comfortable sleep lasting several hours. When the patient passed under the influence of the pentothal sodium, intravenous quinine (10 grains) and subcutaneous adrenaline (10 minims) were given.

Three of the patients appeared to be perfectly normal on awaking, the fourth was comatose for several days. Quinine and mepacrine were given and all recovered. It is surmised that the fall in blood pressure brought about by the pentothal was accompanied by some dilatation of the cerebral vessels and that this, and the action of adrenaline, enabled the quinine to act more quickly on the parasites. However this may be, the pentothal was much more effective than morphine or chloroform in controlling the violence of the patients.

The infections were due to *Plasmodium falciparum*, in British Honduras. *Charles Wilcocks.*

WAR OFFICE. **Notes on the Treatment of Malaria occurring in Individuals returning from Service in Malarious Areas.** 5 pp. 1944, Feb. 29. London: H.M. Stationery Office. [1*d.*]

These notes replace those issued in 1941 [this *Bulletin*, 1942, v. 39, 21]. The recommendations are much the same as before, the principal change being in the treatment advocated if mepacrine is not available. The relevant paragraph now reads as follows:—

"Give 10 grains of quinine, in solution, by mouth three times a day, after food for 7 days, combined with 0·01 gramme of pamaquin three times a day during the last 3 days of this treatment.

"To conserve the supply of quinine it is, however, important that the combined quinine, mepacrine, pamaquin course as laid down in Section III should, whenever possible, be employed."

In the original notes pamaquin was not advocated for use concurrently with quinine. *Charles Wilcocks.*

McGuire, C. **Quinine.** [Indian Tea Association, Calcutta. Mimeographed Circular. 4 pp. Recd. at Bureau March 24, 1944.]

This circular describes the difficulties that have arisen in tea-garden medical practice in hyperendemic malaria areas owing to the existing short supplies of quinine, and how those difficulties have been very successfully overcome. Euquinine, which was relied on for the treatment of infants, and quinine bihydrochloride, for intramuscular injections, have been almost unobtainable. The brand of quinine sulphate now being issued by the Government of Bengal is inferior in appearance, though apparently not in other properties, to the brand issued in former times.

The adult members of the labour population have for the most part been long resident in the locality and have acquired a very high degree of immunity against malaria. On them the shortage of quinine has inflicted little hardship. Of 262 cases of malaria among them, in which no quinine or other specific remedy was given, the fever lasted less than 48 hours in 216, and 206 of the patients (78·6 per cent.) remained free from further fever attacks for a period of 30 days. Of 233 other patients suffering from malaria, who each received but 10 grains of quinine, only 18 per cent. suffered from further febrile attacks during the subsequent 30 days. These results were but little less favourable than those obtained by more intense quinine therapy.

The treatment of infants and young children, prior to the acquisition of immunity, of non-immunes, and of pregnant women suffering from malaria, is always a matter of urgency. The author has found that quinine sulphate can safely replace quinine bihydrochloride for intramuscular injections, which is the routine method of treating infants now that euquinine is unobtainable. The method of preparation is as follows: 100 grains of quinine sulphate are dissolved in 10 cc. of distilled water to which 100 minims of dilute hydrochloric acid (B.P.) have been added. Further distilled water is added to bring the total quantity up to 20 cc. The solution is filtered through moistened filter paper, boiled, and kept in a sterile rubber-capped, or stoppered, bottle. The solution may be reboiled if necessary. One cc. of the solution contains 5 grains of the sulphate. With the new Government brand of quinine the solution is slightly discoloured. Intramuscular injections with this solution are just as effective as bihydrochloride injections and are no more prone to produce abscess formation.

[The author makes no mention of the use of mepacrine or other synthetic antimalaria drug.] *Norman White.*

Parrot, L., Catanei, A., Collignon, E. & Ambialet, R. Nouveaux essais de prophylaxie collective du paludisme par les médicaments synthétiques. [**New Trial of Synthetic Drugs for Collective Prophylaxis of Malaria.**] *Arch. Inst. Pasteur d'Algérie.* 1943, Sept., v. 21, No. 3, 131–79, 21 diagrams. [Refs. in footnotes.]

The first comparative study of the relative value of quinacrine [mepacrine] and quinine, in the mass prophylaxis of malaria, was

undertaken in Algeria in 1935–36, on behalf of the Malaria Commission of the League of Nations. The results showed that quinacrine, 0·05 gm. daily, was insufficient [this *Bulletin*, 1938, v. 35, 422–4]. In 1939 the studies were resumed under the general direction of Ed. Sergent, and the results of these further observations are now recorded. In 1939 0·30 gm. of quinacrine was given to every adult once a week. In 1940 and 1941, 0·20 gm. of quinacrine was given twice a week, and the results compared with those obtained by the daily administration of quinine to comparable populations. Children received proportionally smaller doses. The drugs were given throughout the transmission season to every individual in the experimental areas. The drugs were taken in the presence of visiting nurses in the people's own homes. Spleen measurements were made at the beginning and end of each season's campaign. Blood examinations were made every 15 days from the beginning to the end of the transmission season, and once or twice after the cessation of drug administration. Individual cards were kept. Stress is laid on the importance of repeated blood examinations in studies of this kind, to determine the nature of infections and parasite density. Of chief significance are monthly variations in plasmodimetric indices, especially in children in the 0 to 15 age groups [for explanation of plasmodimetric index see this *Bulletin*, 1943, v. 40, 739].

The 1939 observations were carried out on a community of agricultural workers and their families, numbering in all 389 persons, living in a very unhealthy part of the Department of Constantine close to the wadi Rmel, where malaria is hyperendemic. The numerous canals and irrigation channels are prolific in the production of *A. maculipennis labranchiae*. Quinacrine was administered from the 1st of June to the 31st of October. It was a severe epidemic year and the dose administered, 0·30 gm. once a week for ages 10 years and over, 0·10 and upwards for lower ages, was insufficient to prevent an epidemic of *P. falciparum* malaria, and to a less degree of *P. vivax* malaria, among the "protected" population while the medication was still in progress. A markedly reinforced reservoir of infection remained after the termination of the experiment.

For the 1940 and 1941 observations a very unhealthy, marshy locality at the mouth of the wadi Reghaia was chosen. Breeding of *A. maculipennis labranchiae* was intense. Communities on either side of the river were of approximately equal size but there were great economic and social differences between the two. The natives on the left bank (403 persons) were a settled community of land owners and their families living in fairly well constructed houses, and reasonably prosperous. On the right bank the community of 457 persons consisted for the most part of casual daily workers and their families, living in huts. Their earnings were small and they sometimes sought work far afield. In the 1940 campaign dwellers on the left bank received quinacrine; those on the right bank quinine. In the 1941 campaign the right bank formed the quinacrine group, and the left quinine. Quinacrine was given in doses of 0·20 gm. twice a week, at two or three days' interval, to all over the age of 8: lower ages received from 0·05 to 0·15 gm. Quinine 0·40 gm. was given daily except Sundays to all over the age of 10; lower ages received from 0·10 to 0·20 gm. daily. The period of administration was from May 1st to November 30th. Favourable and approximately equal results were obtained with quinine and quinacrine thus administered. Both drugs diminished the reservoirs of infection, more especially of *P. vivax* and of *P. malariae*; quinacrine

was superior in this respect. Neither drug completely suppressed the epidemic of *P. falciparum* malaria.

In all the experiments quinacrine was well tolerated inasmuch as there were no toxic accidents. From 9 to 17 per cent. of persons receiving quinacrine twice a week developed some yellow discolouration of the skin, which caused a certain number of women to refuse to continue the treatment. The administration of quinacrine to small infants by spoon frequently provokes immediate vomiting; this is a serious obstacle to drug prophylaxis in this earliest age group.

The conclusions are reached that quinacrine can replace quinine in mass prophylaxis among the natives of Algeria, given a conscientious and disciplined staff for distribution and adequate medical supervision; that neither quinacrine nor quinine can give more than partial and quite temporary protection, and that drug prophylaxis cannot replace other measures of defence against malaria, notably antimosquito measures, wherever such are practicable. *Norman White.*

i. RAEVSKY, G. E. [**Experiment on Malaria Zooprophylaxis in the Village Shitkhala, Kabardino-Balkarian ASSR (1938–40).**] *Med. Parasit. & Parasitic Dis.* Moscow. 1942, v. 11, No. 4, 11–21. [In Russian.]

ii. SHEINKER, K. P. [**The Effectiveness of Zooprophylaxis in a Village with High Malaria Incidence.**] *Ibid.* 22–8, 1 chart. [In Russian.]

iii. PLATONOV, N. V. & TARABUKHIN, I. A. [**Experiment on Malaria Zooprophylaxis in Western Siberia.**] *Ibid.* 29–38. [In Russian.]

iv. ZAVOYSKAYA, V. K. [**Experiment on Malaria Zooprophylaxis in Villages on the Kutuluk Barrage Lake.**] *Ibid.* 38–46, 4 figs. [In Russian.]

v. RAEVSKY, G. E. [**The Influence of certain Factors on the Effectiveness of Malaria Zooprophylaxis.**] *Ibid.* 52–7. [In Russian.]

vi. RAKHMANOVA, P. I. [**Evaluation of the Suitability of different Types of Animal Houses and of various Domestic Animals as a Zooprophylactic Barrier against** *A. maculipennis*.] *Ibid.* 57–60. [In Russian.]

vii. POLUMORDVINOV, A. D. [**The Attraction of various Animals for** *A. maculipennis*.] *Ibid.* 61–3. [In Russian.]

viii. RAEVSKY, G. E. [**Instructions for Malaria Zooprophylaxis.**] *Ibid.* 64–7. [In Russian.]

The papers listed above all deal with various aspects of zooprophylaxis against malaria. This is based on the pronounced zoophilism of certain anopheline mosquitoes, on account of which it is possible to establish a protective barrier of animal houses (cowsheds, stables, pigsties, etc.) between human dwellings and the mosquito breeding places. Since zooprophylaxis represents an important and, in some cases, the only method of protection against malaria, observations and experiments have been carried out in various parts of U.S.S.R., with the view of determining the most effective method of its practical application, and the various factors affecting it. It is claimed that the use of domestic animals for zooprophylaxis is only practicable in the Soviet Union,

where livestock, being common property, can be fully controlled by the State.

i. Raevsky describes his experiences in a village of the Kabardino-Balkarian republic (Caucasus), where the chief vector is *Anopheles maculipennis* (mainly *typicus*, occasionally *atroparvus* and *messeae*). In this village the average number of cattle per head of the population was about one, and the animals were stabled for the night 1–1½ hours after the mosquitoes became active. The best results were obtained by placing the cow-houses between the mosquito breeding places and the human dwellings at a distance of 30 metres from the latter, and at intervals of 50 m. from each other. Under these conditions there was not only a considerable diminution of the number of mosquitoes found in human dwellings but also an almost complete absence of attacks by these insects on people inside the barrier. Moreover, the number of mosquitoes harbouring sporozoites was reduced to about one-eighth.

ii. Working in the same locality, Sheinker records the results of the zooprophylactic measures, undertaken in 1940, upon the incidence of malaria as compared with 1938. It was found that there was a drop in all the malaria indices: parasite rate from 15·4 to 3·5, spleen rate from 28·9 to 7·0, endemic index [total percentage showing objective signs of malaria] from 39 to 9·2. The percentage of fresh infections decreased, in the case of the whole population, from 47·9 to 15·7, and, in the case of persons living within the protected zone, from 43·4 to 12·0. It is suggested that in hyperendemic areas zooprophylaxis should be reinforced by drug treatment as well as by direct anti-mosquito measures.

iii. Platonov and Tarabukhin describe their experiments on two State farms of Western Siberia in 1937–40, the chief local vector being *A. maculipennis* (*messeae*). In one of the villages animal houses (containing cattle and pigs) were built according to plan, viz. 6–40 m. from human dwellings, at intervals of 7–180 m. from each other. In the other village, which served as a control, the original housing of livestock was not interfered with. In spite of the imperfection of the barrier in the experimental village, it resulted in breaking contact between mosquito and man, for in 1940 precipitin tests revealed no human blood in the mosquitoes and there were no fresh cases of malaria in the settlement.

iv. Zavoyskaya deals with the protection of certain villages in the Kuibyshev region from mosquitoes (*A. maculipennis*, chiefly *messeae*) breeding in a neighbouring barrage lake. In two test villages the barrier consisted of cattle sheds (about 4·7 cows per house) interposed between the lake and the houses, at average distances of 5–11 m. from the latter and 20 m. from each other. Other villages served as controls. In view of the low incidence of malaria in the locality the results of the prophylactic measures were assessed on entomological grounds. It was found that while in one village, where the distance between the cowsheds and houses was 11 m., the barrier was completely effective, in the other where they were separated by 5 m. only, mosquitoes continued to be fairly numerous in human dwellings.

v. Raevsky discusses the influence of certain factors upon the effectiveness of the "zoobarrier." Since mosquitoes are attracted to their prey by smell it was thought that the direction of the wind was an important factor. Actual tests have shown that in view of the variability of the wind in the course of the day smells are carried to water collections dispersed over an arc from 90° to 180°, at a distance of 3 km.

from the settlement. Therefore, the flight of mosquitoes (which is against the wind) depends only upon whether they are on the windward or leeward side. In one village it was estimated that, when the velocity of the wind was 1–3 on the Beaufort scale [2–12 miles per hour], the average number of female mosquitoes found in animal houses of the barrier on the leeward side of the human dwellings was 33·5, in those on the windward side 16·3, while on calm nights they amounted to 19·3. On the other hand, animal houses standing very near to water collections are visited regularly by mosquitoes, irrespective of the direction of the wind.

During hot summer nights the cattle are allowed to spend the night in the open. It was demonstrated that if the animals are kept 5–6 m. from their sheds their effectiveness as a barrier is not thereby diminished.

vi. Working in the Caucasus, Rakhmanova made observations on the suitability of various types of animal houses from the point of view of their attraction for mosquitoes. The best results were obtained in well-built houses, with adequate ventilation (but without excessive draught), with windows and doors facing the breeding places, and a thick waterproof roof. As regards the degree of attraction for mosquitoes, domestic animals can be arranged in the following order (the figures indicating exposure to attacks): goat 2, calf 5, pig 10, cow 20, buffalo 60. It would appear that the degree of attraction is in direct proportion to the area of the body, and the amount of warmth and smell given off by it. These factors should be taken into consideration when planning the barriers.

vii. The same problem is dealt with by Polumordvinov, on the basis of observations made in the Kazan province. This author found that cows represent a more effective barrier against mosquitoes than horses, since the latter are much more sensitive to mosquito bites and frequently drive the insects away before they had time to feed. In constructing an animal barrier it should therefore be taken into consideration that stables are less likely to attract mosquitoes than byres. Observations made in one village showed that the presence of livestock (38 horses, 82 cows, 8 pigs, 240 sheep, 46 goats—on the average three animals per household) resulted in deflecting from man 98·7 per cent. of the mosquitoes.

viii. In view of the successful results of the foregoing (and other) experiments and observations it is proposed to adopt zooprophylaxis as a practical measure of malaria control in rural areas. Raevsky summarizes the position and makes a number of practical suggestions, of which the following are the most important: (1) The "zoobarrier" consists of a row of animal houses between the mosquito breeding places and the human dwellings. (2) It is desirable that the animal houses should be situated on the leeward side of and on a lower level than the settlement; if possible, they should be parallel to the periphery of the settlement. (3) The distance between the barrier and human houses should not be less than 200 m. (in the case of piggeries 250 m.). (4) The animal houses should be separated from each other by the following gaps: byres 50 m., pigsties 45 m., sheep-pens 50 m. (5) The doors and yards of the animal houses should be on the leeward side. (6) In the space between the barrier and human dwelling there should be vegetation. (7) When livestock are grazed during the daytime they should be stabled not later than half an hour before sunset, *i.e.* before the mosquitoes become active in the evening. *C. A. Hoare.*

RODHAIN, J. & DELLAERT, R. L'infection à *Plasmodium malariae* du chimpanzé chez l'homme. Etude d'une première souche isolée de l'anthropoide *Pan satyrus verus*. [**Infection of Man with** *Plasmodium malariae* **of the Chimpanzee.**] *Ann. Soc. Belge de Méd. Trop.* 1943, Mar. 31, v. 23, No. 1, 19–46, 3 graphs & 3 charts (2 folding).

In an earlier paper [this *Bulletin*, 1943, v. 40, 438] Rodhain has recorded his successful inoculation of the quartan-like parasite of the chimpanzee to human beings. The result of this observation was his conclusion that this parasite of the chimpanzee was actually *Plasmodium malariae* and not a distinct species for which the name *P. rodhaini* had been proposed by BRUMPT. In the present paper are given details of the infections produced in 22 individuals with this parasite, 14 of them being in series. It is noted that the infection is a mild one, with relatively small numbers of parasites in the blood. Of the 22 infections, 17 were of the quartan type. The majority of the patients recovered spontaneously without treatment. The average number of attacks in 12 of the cases was 11. In the series of 14 direct passages from man to man there was no evidence of any increase in intensity of the infection. The strain under observation was compared with three well-established strains of *P. malariae* of human origin. All three gave rise to more severe attacks of malaria which are less easily controlled by quinine than the chimpanzee strain. On the other hand there was no difference in the resistance to arsenobenzol. It was evident that the chimpanzee strain was one of low virulence, but there was no evidence to indicate that this was due to the fact that virulence has been lost during its sojourn in the chimpanzee. *C. M. Wenyon.*

PESSÔA, S. S. B. & BARRETO, M. P. Malaria Aviaria. II. Sobre uma raça agametocitogênica de *Plasmodium cathemerium* Hartman, 1927. [**A Non-Gametocytogenic Race of** *P. cathemerium.*] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1943, Jan., v. 8, No. 17, 17–20. English summary (9 lines).

Maintaining a strain of *Plasmodium cathemerium* in canaries by intramuscular injections of blood, the author noticed that at the thirtieth passage gametocytes no longer appeared. This gametocyte-free strain was carried on in other birds, in which it continued to develop without gametocytes. It differed from the original strain in its marked asynchronism and its increased virulence, and in the ragged appearance and loss of affinity for stains of the individual parasites. *C. M. Wenyon.*

BARRETO, M. P. Malária aviaria. I. Transmissão do *Plasmodium cathemerium* Hartman, 1927 pelo *Culex fatigans* Wiedmann, 1828. [**Transmission of** *P. cathemerium* **by** *C. fatigans.*] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1943, Jan., v. 8, No. 17, 9–14. English summary.

Experimenting with a strain of *Plasmodium cathemerium* maintained in tico-tocos (*Brachyspiza pileata*), the author has obtained complete development in *Culex fatigans.* *C. M. Wenyon.*

BECKMAN, H. & SMITH, Jane. **The Apparent Advantage of Frequently Administered Quinine in Avian Malaria Infections.** *J. Lab. & Clin. Med.* 1944, Jan., v. 29, No. 1, 43–7, 1 chart.

By treating canaries infected with a virulent strain of *Plasmodium cathemerium*, an attempt was made to obtain an answer to the question: Will the continuous administration during 24 hours of a certain quantity of quinine sulphate be more curative than the same quantity administered in three doses in 12 hours? As, in birds, it was not possible to adopt the continuous drip method, it was decided to compare the treatment with three doses of 1 mgm., given at 8 a.m., 2 p.m. and 8 p.m., with treatment with 0·25 mgm. given every two hours during the 24 hours. This treatment of 10 birds in each group was commenced on the fifth day following the infective mosquito bite, and was continued through four days. The result showed clearly that in the case of the two-hourly dosage the height of the infection was reached a day earlier, and was less intense than in the three-dose series, while growth rate of the parasites was retarded to a greater extent. In both the treated series, at the height of the infection there were fewer parasites present than in the untreated controls. This shows definitely that a treatment approaching the continuous gives better results than the usual method of three doses in 12 hours. There would seem to be justification for the trial of continuous administration of quinine in the treatment of human malaria. *C. M. Wenyon.*

DAS GUPTA, B. M. & SIDDONS, L. B. **Tests with Mepacrine Hydrochloride, *B.P.* against *Plasmodium relictum*.** *Indian Med. Gaz.* 1943, Jan., v. 78, No. 1, 42–3.

The authors have tested the action of mepacrine hydrochloride on *Plasmodium relictum* infection in canaries. The drug (manufactured in India) was administered by tube into the crop in daily doses of 4 mgm. in 0·5 cc. of distilled water. Though the experiments were somewhat vitiated by the death of three out of the five birds employed, enough was observed to show that the drug reduced the infection, and that it had degenerative effects on all stages of the parasites.

C. M. Wenyon.

BOCK, E. & OESTERLIN, M. Ueber einige fluoreszenzmikroskopische Beobachtungen. [**Observations with the Fluorescence Microscope.**] *Zent. f. Bakt.* I. Abt. Orig. 1938–39, v. 143, 306–18.

The fluorescence microscope was first used in protozoology and bacteriology much later than in botanical work. The earlier studies were made on trypanosomes to observe whether there was any relationship between the absorption of a dye by the parasites and its chemotherapeutic action. The results were indefinite since not only active drugs but also inactive substances diffused into the parasites. Oesterlin showed that this diffusion had no significance, but the specifically active drugs were absorbed after doses, at or below the threshold of their activity, had been given, and by special parts of the parasites (blepharoplast, volutin particles); with inactive substances there was merely a physical diffusion, varying with the concentration of the substances in the blood, and fluorescence was only seen with high concentrations. All these observations were made on vitally stained parasites after injection of the drug into the infected animal (rat or

mouse). HAGEMANN [see *Bulletin of Hygiene*, 1937, v. 12, 606] used the fluorescence microscope to show the viruses of ectromelia and canary-pox, and the present authors were able to use the same set of apparatus for their researches. They employed both vital staining (especially for malaria parasites) and stained smears for various parasites.

Observations on monkey malaria treated with atebrin and quinine.—The drugs were injected intramuscularly into *Macacus rhesus* monkeys infected with *Plasmodium knowlesi* and *P. inui*; films were examined with the fluorescence microscope and parallel examinations of films, stained with Giemsa's stain, were made. Greater fluorescence and better contrast with the background were obtained with atebrin than with quinine; with the former it appeared within 10 minutes after injection but not for 3 hours with quinine. With atebrin it reached a maximum within 30 minutes and this was maintained for 2½ hours, after which it diminished, and after 22–24 hours, even with the strongest dose, fluorescence was very weak. The effects on the different stages of the parasite are described in detail. Atebrin is taken up by the parasites before the Giemsa-stained smears show the morphological changes in the parasite that are caused by the drug.

Staining of protozoa, bacteria and viruses with fluorescent dyes.—The author selected the following substances: atebrin, trypaflavin and rivanol, which contain acridine; primuline which contains sulphur; and a basic auramine derivative whose formula is given. The smears, fixed or unfixed, were stained for 5 minutes with 0·1 per cent. solutions of the drugs, the primuline solution being used with the addition of 0·2 per cent. phenol. They were afterwards washed with methyl alcohol to remove precipitates.

Trypanosomes, relapsing fever spirochaetes, leishmania, and malaria parasites of man, monkey and bird, were stained best with rivanol; *Leptospira icterohaemorrhagiae* was stained only by primuline but the ends remained unstained, which seems to show that the ends of the parasite are of different composition from the rest. Primuline appears to be a specific stain for lipoid and fatty substances and for this reason leishmania in spleen smears, and lymphogranuloma virus in brain smears could not be distinguished by it. The fluorescent particles seen in smears containing the viruses of ectromelia and canary-pox, were very probably the parasites, since the preparations were made from tissues free from fat. Tubercle bacilli were stained best with auramine.

The author considers that the fluorescence seen in monkey malaria treated with atebrin indicates a direct action of the drug on the parasites. *J. F. Corson.*

PATTON, R. L. & METCALF, R. L. **The Demonstration of the Protozoan Parasite of Quail Malaria by Fluorescence Microscopy.** *Science.* 1943, Aug. 20, 184.

Dyes which fluoresce with ultraviolet light have been used in recent years for staining tubercle bacilli and other organisms [see *Bulletin of Hygiene*, 1937, v. 12, 606; 1942, v. 17, 207, 357, 358, 439, 582; 1943, v. 18, 78; 1944, v. 19, 65]. BOCK and OESTERLIN (above) used them in studies of the action of antimalarial drugs

[atebrin, quinine and other substances on plasmodia, trypanosomes, leishmania and leptospira]; more recently they have shown that *Plasmodium vivax*, *P. nucleophilum* and *Haemoproteus* sp. (from the California Valley quail) can be stained satisfactorily with fluorescent dyes. [See also VON JANCSÓ, this *Bulletin*, 1932, v. 29, 647; HAWKING, *ibid.*, 1939, v. 36, 660, and 1942, v. 39, 238].

In the work recorded in the present paper, *Haemoproteus* sp. of the quail was used. Saturated aqueous solutions of six fluorochromes were applied for 2 to 5 minutes to smears fixed in methyl alcohol. The results are shown in the table:—

Stain	Nuclear colour	Parasite colour	Leucocyte colour	Staining intensity
Berberine sulphate	Bright yellow	Golden	Yellow	+++
Rivanol	Yellow green	Yellow green	Bright yellow	+++
Primulin yellow...	Blue	Blue white	Yellow	+++
Coriphosphine O	Orange	Orange	Bright orange	++
Thioflavin ...	Yellow	Yellow	Yellow	++
Auramine O ...	Yellow	Blue white	Bright yellow	+

The apparatus is relatively simple; a G.E. type H-4 high pressure mercury vapour lamp and a Corning filter No. 5840 (transmitting light waves of 310 to 394 mμ) were used. The parasites are seen as brightly fluorescent objects against a dark field. *Haemoproteus* and the plasmodia of human malaria are easily seen with dry lenses at magnifications not above 200 × and eyestrain is much diminished.

J. F. Corson.

TRYPANOSOMIASIS.

DE BURGOS DÍAZ-VARELA, Feliciano. Aportaciones al estudio de la tripanosomiasis humana en Santa Isabel de Fernando Póo. [**Human Trypanosomiasis in Santa Isabel, Fernando Po.**] [Thesis.] Reviewed in *Med. Colonial.* Madrid. 1944, Feb. 1, v. 3, No. 2, 101–5.

This article is a review of the author's paper on human trypanosomiasis in the Santa Isabel district of the island of Fernando Po, Spanish West Africa. The campaign against sleeping sickness (*Trypanosoma gambiense*) was begun in 1928 and was supported by regulations in 1933. Diagnosis was made by surveys of the population with blood examination, gland puncture and lumbar puncture. Travelling was controlled by passports and infected persons received treatment cards. All patients, whether in the early or late stage, were treated with Germanin [doses not given] administered daily for 5 to 10 days; patients in the

late stage [infection of the central nervous system] were treated, after the course of Germanin, with tryparsamide or a similar arsenical preparation. Some figures are given to illustrate the success of the campaign: in 1933, of 49,102 thick blood films examined, 933, showed trypanosomes, while in 1942, of 122,854 films, only 205 were positive; during the first six months of 1943 there were 81 positive blood films among 69,080 examined.

The author thinks that anti-tsetse measures should be undertaken and that domestic animals, which are susceptible to the infection, should not be kept. Prophylactic use of Germanin for the whole population is worth a trial. *J. F. Corson.*

HOLDEN, J. R. **The Diagnosis of Trypanosomiasis in West Africa.** *J. Roy. Army Med. Corps.* 1944, Feb., v. 82, No. 2, 88–92.

This is a short clinical description of Gambian sleeping sickness with notes on four advanced cases. The technique of gland puncture is described. A standard course of treatment was given, consisting of three or four intravenous injections of 1 gm. of antrypol [Germanin] at five-day intervals, followed by five or six injections of 2 gm. of tryparsamide, the course being completed in 35 to 45 days. [Some of the author's statements will not be generally accepted; cerebrospinal fluid containing 7 cells per cmm. cannot safely be regarded as normal; 3 or 4 cells based on three counting-chamber specimens would be a safer figure. It is surely extremely unlikely that trypanosomes would acquire fastness to tryparsamide as a result of one or two injections of 2 gm. of the drug, see YORKE *et al.*, this *Bulletin*, 1933, v. 30, 447.]
J. F. Corson.

SENEKJIE, H. A. **Biochemical Reactions, Cultural Characteristics and Growth Requirements of** *Trypanosoma cruzi*. *Amer. J. Trop. Med.* 1943, Sept., v. 23, No. 5, 523–31, 2 figs. [12 refs.]

The author has used human, insect (*Triatoma*) and armadillo strains of *T. cruzi* for the study of its biochemical reactions, physical properties and growth requirements in culture. Cultures were made in different media, including a modification of the author's leishmania broth-agar and a new egg-liver extract medium. It was found that all the strains behaved in a similar manner. They formed characteristic colonies on the agar medium and grew well in the egg-liver extract. An essential growth-promoting factor (not vitamin B-complex or C) is apparently present in the serum and in red blood corpuscles. As regards the vitamin requirements of this trypanosome, thiamin chloride, nicotinic acid and pyridoxin stimulated growth, ascorbic acid lacked this property, while riboflavin and calcium pantothenate were toxic. There was abundant growth of the trypanosome in thirteen sugars, but without fermentation or gas production. In methyl red and Voges-Proskauer media the reactions were negative. The trypanosomes failed to produce H_2S in lead-acetate-serum-agar medium; their growth in a mild-serum medium was feeble, and produced no changes. The thermal death point of *T. cruzi* was more than 3½ hours at 40°C., and between 15 and 30 minutes at 45°C. Bile dissolved these trypanosomes in 96 hours. *C. A. Hoare.*

MAZZA, S. Comprobación de *Eutriatoma oswaldoi* (Neiva y Pinto, 1923) Pinto, 1931, y *Eutriatoma sordida* (Stal, 1859) Pinto, 1931, en la República del Paraguay. [**Verification of** *Eutriatoma oswaldoi* **and** *E. sordida* **in Paraguay.**] *Prensa Méd. Argentina.* 1943, Dec. 1, v. 30, No. 48, 8 pp. [15 refs.]

Till recently three species only of Triatomidae were known to exist in Paraguay, namely, *Panstrongylus geniculatus*, *P. megistus* and *Triatoma infestans*. In April 1943 eight specimens of bugs were sent to the author; one only was still alive, a *T. infestans*, and it was not infected with *T. cruzi*. Four others were too dried up for examination; the remaining three were two males and one female *E. oswaldoi*, but they too were dried and infestation could not be proved. This insect has been known to exist in other parts of S. America, in the Provinces of Córdoba, La Rioja, Santa Fe, Salta, Mendoza and the Argentine. *E. sordida* was not known to occur in Paraguay, but in 1940 when an arranging of the collection of Triatomidae in an Argentine Museum was being undertaken three specimens were found labelled as having been captured in Paraguay. During 1943 this species has been caught in several fresh places in the Argentine and other Provinces, but Paraguay is not on the list. *T. infestans* is commonly found infected in Paraguay, especially in the small forts maintained on the left bank of the Pilcomayo. In three of these forts 17 adults, 9 nymphs and 4 larvae were captured (30 specimens in all) and 6, 6 and 3 respectively (15) were found infected by *T. cruzi*. *H. Harold Scott.*

BADINEZ SEPÚLVEDA, O. Encuestas rurales sobre enfermedad de Chagas en la provincia de Santiago. [**Inquiry into the Presence of Chagas's Disease in a Country District of Santiago, Chile.**] *Rev. Chilena de Hig. y Med. Preventiva.* 1943, June, v. 6, No. 1, 1–9. English summary.

An investigation was carried out on a country estate in Las Condes department, Santiago Province, Chile. Ninety habitations were visited and *Triatoma infestans* was found in 58 (64·4 per cent.) of them; 418 of the bugs caught were examined and 150 (35·8 per cent.) were found infected. Machado's reaction was tested in 139 persons; 36 were positive, 34 others doubtful, and of 67 tested by the xenodiagnostic method 8 were positive. Altogether 43 cases of Chagas's disease were detected; 26 of them subacute, 4 chronic, and 13 serologically positive or with latent signs (shown by electrocardiographs). Three animals (8·1 per cent.) of 37 examined, namely two dogs and one cat, gave positive results to xenodiagnostic tests; in 54 others (dogs and cats) the diagnostic tests could not be carried out. A series of tables presents the details of each of the 43 cases. *H. Harold Scott.*

CARMONA DE LA FUENTE, A. Algunas observaciones sobre triatomideos y enfermedad de Chagas en Inca de Oro. [**Triatomidae and Chagas's Disease in Inca de Oro.**] *Rev. Chilena de Hig. y Med. Preventiva.* 1943, June, v. 6, No. 1, 37–48, 4 figs. on 1 pl. [13 refs.] English summary.

Inca de Oro is a small mining settlement in the Chañaral department of Atacama Province, Chile, about midway between the mountains and the coast.

In his practice the author met with an acute case of American trypanosomiasis in a lad of 17 years. The case was clinically typical, but the eye symptoms more severe than usual, with exophthalmos, ectropion (well shown in an illustration) and diplopia and blurred vision. Triatomidae abounded in the hut in which he lived and of 30 caught 15 were infected. Three species are found in the district: *T. infestans*, *T. spinolai*, and *Triatomaptera porteri*; of these the first is the most to be feared, for it lives in the huts and attacks at night.

The patient was given two courses of 5 intramuscular injections each of 5 cgm. of 7602 (Ac) Bayer and all his symptoms cleared up, but the Machado reaction remained positive. *H. Harold Scott.*

ROMEIRO, O. dos S. Caso agudo mortal de moléstia de Chagas, com sinal de Romaña, observado em Pires do Rio, Goiás. [**A Fatal Case of Chagas's Disease in Pires do Rio, Goiás.**] *Brasil-Medico.* 1943, Oct. 2 & 9, v. 57, Nos. 40 & 41, 404–5, 1 fig.

LEISHMANIASIS.

LIPSCOMB, F. E. & GIBSON, M. O. J. **Visceral Leishmaniasis (Kala-Azar) in an Adult contracted in Malta.** *Brit. Med. J.* 1944, Apr. 8, 492–3.

The case reported is that of an air-gunner 20 years of age who contracted kala azar in Malta. It is stated that records of only four earlier cases in adults from the island could be traced. He was treated with neostam in daily doses of 0·05 gm., but owing to an uncontrollable cough the course had to be stopped when 2·5 gm. had been given. After an interval of three weeks, leishmania being still present in bone marrow smears, 1·85 gm. were administered in doses of 0·2 gm. In this dosage the cough was less troublesome. Six weeks later the clinical condition was not improved, so a course of sodium antimony gluconate was given, consisting of daily intravenous injections during 15 days till 86 cc. had been administered. Following this treatment a steady improvement set in. When seen five months later the patient had been doing full ground duty, and looked well. It is noted that though the patient had revealed a well-marked syndrome of low-grade fever, cough, adenitis, splenomegaly and leucopenia, the cause of his condition remained for many months unrecognized both in Malta and after his return to England. *C. M. Wenyon.*

BRAHMACHARI, P. N. **Some Observations on Brahmachari's Disease (Post-Kala-Azar Infection of the Skin with *Leishmania donovani*).** *Indian Med. Gaz.* 1943, Dec., v. 78, No. 12, 588–90.

The author describes the case of a man, 22 years of age, who in 1919 was successfully treated for kala azar by 18 injections of sodium antimony tartrate. Two years later the patient noticed erythematous patches and small papules on the skin of the body. In 1922 the author made a note of the character and position of the skin lesions. Eleven years later the patient was again seen. It was observed that the lesions had changed in character, while new lesions had appeared. It was possible to deduce the sequence of the changes which had occurred in

the individual lesions. These were: firstly erythema, then depigmentation, followed by small reddish patches, some of which consisted of coalesced red papules, and finally red nodules. On the subject of treatment, the author notes that certain cases of post-kala-azar dermal leishmaniasis respond to antimonial treatment as readily as do ordinary cases of kala azar, while others are absolutely resistant. Others again occupy an intermediate position. *C. M. Wenyon.*

BRAHMACHARI, P. N. **Post Kala-Azar Infection of the Skin by** *Leishmania donovani* **(Brahmachari's Disease).** *Calcutta Med. J.* 1943, Apr., v. 40, No. 4, 139–42.

ROTH, J. **Treatment of Mediterranean Kala-Azar with 4 : 4′ Diamidino-Stylbene.** *Harefuah.* Jerusalem. 1944, Feb. 1, v. 26, No. 3. [In Hebrew 47–8. English summary 48.]

"A description is given of a case of kala azar of a girl, seven years of age, a Polish refugee from Teheran, completely cured with 42 intravenous injections of 4 : Diamidino Stilbene. In addition to the specific treatment, sugar, calcium and albumins have been administered. No toxic manifestations appeared."

STERNFELD, G. **Leishmaniasis of the Skin in Haifa and the North of Palestine.** *Harefuah.* Jerusalem. 1944, Feb. 1, v. 26, No. 3. [In Hebrew 43–4. English summary 45.]

"The author analyses 161 cases of Leishmaniasis in Haifa, the spreading of the disease in that city and in the North of Palestine and reaches the following conclusions:

"1. Leishmaniasis, an endemic disease in Palestine, is continually spreading. Haifa and the Northern part of Palestine which were heretofore considered free from Leishmaniasis, have also become nests of this disease during recent years.

"2. The spreading of the disease from its original foci in the neighbourhood of the Dead Sea and Jericho, is apparently connected with the industrial development of this district. Immigration from affected regions like Aleppo, etc., and the habit of the Arabs to leave it untreated are additional contributory factors to the spread of the disease.

"3. New centres of Leishmaniasis are bound to appear in the North if the sporadic cases will not soon be discovered and radically treated."

PEÑA CHAVARRIA, A., SÁENZ HERRERA, C. & CORDERO, E. El tártaro emético por via oral en la leishmaniasis cutáneo-mucosa, especialmente útil en el tratamiento del niño. [**Oral Administration of Tartar Emetic for Cutaneous Leishmaniasis, especially useful for Treatment of Children.**] *Rev. Méd. de Costa Rica.* 1943, Jan., v. 5, No. 105, 361–8, 7 figs.

The authors record the successful treatment of cutaneous leishmaniasis by oral administration of a solution of tartar emetic. The solution was prepared by dissolving 2 gm. of the drug in 80 cc. of chloroform water. In this strength one drop of the solution contained approximately 1 mgm. of tartar emetic. In children treatment was commenced by giving one drop a day. This dose was increased by a drop every three or four days till the limit of tolerance without diarrhoea or

vomiting was reached. In adults the initial dose was 5 to 15 drops, according to the constitution of the individual. As in children, the dose was increased to the limit of tolerance. Complete healing was obtained in three to four months in a number of illustrative cases described. *C. M. Wenyon.*

FEVERS OF THE TYPHUS GROUP.

FELIX, A. **Technique and Interpretation of the Weil-Felix Test in Typhus Fever.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Mar., v. 37, No. 5, 321–41. [54 refs.]

This valuable paper has been written in response to requests [including one by the reviewer].

By using Rickettsial suspensions for agglutination and complement-fixation tests it is already possible to differentiate some of the types of typhus fever which give the same response to *Proteus OX* organisms, but for the present the Weil-Felix test is the only one generally available.

In 1916 and 1917 the author carried out a large series of tests in Poland and Turkey, using *Proteus X19* and *Pr.X2*; about 75 per cent. of the cases gave significant reactions to *X19* by the 4th or 5th day, and later had high maximum titres, mostly over 1–2,000, shortly before or shortly after defervescence. The remaining 25 per cent. showed positive reactions about the 6th or 7th day; exceptionally later. The maximum titres in the latter group were low, usually less than 1–500. The type of the titre curve was generally related to the clinical course of the illness: (*a*) moderately severe cases usually showed high-titre reactions; (*b*) the most severe cases gave very low titres; and (*c*) the mildest cases might have very low or very high titres.

The upper limit of agglutination with *Pr. OX19* in persons not suffering from typhus is regarded by most workers as 1–100, but by some as 1–200; though in countries where the disease is endemic it may be considerably higher.

After high-titre reactions residual agglutinins usually persist for three to four months so that retrospective diagnosis is often possible, but after low-titre reactions there may be a negative response almost immediately after recovery.

Persons who normally agglutinate *OX19* in titres of 1–50 to 1–100—or who have residual agglutinins in titres of 1–100 to 1–200—and who are attacked by typhoid or other febrile illness, do not show any increase in the titres during these fevers.

After inoculation with vaccines made from Rickettsiae "of the *OX19* group" [*R. prowazeki* and *R. mooseri*] agglutinins often appear, but the titres are relatively low and of varying persistence; some vaccines do not stimulate agglutinin formation. In these inoculated persons a rising curve of *OX19*-agglutination is diagnostic of typhus; the curve is often of the low-titre type.

Standardized alcohol-treated suspensions from the Standards Laboratory (Medical Research Council) at Oxford are strongly recommended. Round-bottomed test tubes, about $2 \times \frac{1}{2}$ inch, are preferred to the Dreyer tubes in which the deposit is not easy to see. Low

dilutions of 1–25 and 1–50 should always be included in the first tests. The tubes are incubated at 37°C. for two hours and are read after 22 hours at room temperature, or, in the tropics, after the same time in the ice chest.

Readings with a lens at the end of two hours often help in the early detection of high-titre reactions. The titre is stated in terms of any agglutination visible to the naked eye; there should be a control by the inclusion of sera of known titres. High-temperature incubation of 50° to 52°C. is not recommended.

Infection by *Pr. vulgaris* may give rise to positive reactions; one observer states that it may also cause agglutination of *R. prowazeki*.

Inhibition of the agglutinins at low titres may occur with fresh sera; these sera may react after heating for half an hour at 45°C.

Complete agglutination ("total" in the Dreyer scale) at 1–80 is significant except in persons inoculated with Rickettsia vaccine during the preceding two or three months; in these complete agglutination in a titre of 1–200 is significant. In persons from endemic areas titres in excess of 1–200 may occur in the absence of typhus infection.

The essential point is that the titre should show a pronounced rise in the course of 48-hourly tests; a constant titre throughout the illness is evidence that the disease is not typhus.

Complete agglutination at 1–25 or 1–50 is as decisive, when it follows earlier negative reactions, as high-titre agglutination.

"Inapparent" cases can be diagnosed with certainty by rising-and-falling titres.

The rapid "slide-agglutination" tests are useful in special conditions.

In flea-borne murine typhus, often inappropriately called endemic typhus, the reaction is similar to that in louse-borne typhus; it occurs just as early as in mild or modified louse-borne typhus.

In tick-borne typhus the reactions are highly irregular; positives with *OX2* only, or with *OX2* in higher dilutions than with *OX19*, are usually confirmatory of boutonneuse fever, but when the reaction to *OX19* is the stronger no help is obtained. The reaction is often much delayed. In India suspensions of *OXK* must also be used.

In mite-borne typhus, *OXK* is the only *Proteus* organism that responds, but titres below 1–160 are not significant, and suspensions are liable to become unsatisfactory on keeping. Adequate controls are needed to exclude false positives. The reaction is often delayed, the maximum titre is usually reached in the 3rd or 4th week, though in India the suspensions prepared by BRIDGES give earlier responses. Rising-and-falling titres should be looked for.

[The following comments do not deal with the main part of the paper which will be warmly welcomed as an invaluable guide to the interpretation of the Weil-Felix reactions, when carried out in the conditions laid down by the author.]

In the paper a table is included which shows the provisional classification of the typhus group of fevers already proposed by the author.

This classification is based on the types of agglutination reactions to the *Proteus* organisms, *OX19*, *OX2*, and *OXK*; these reactions are regarded by the author as indicating the immunological sub-group to which each kind of typhus fever belongs, and therefore as constituting the most suitable basis for classifying the fevers. Acceptance of this view involves the difficulty that many of the individual cases belonging to the "indeterminate" sub-group give the same reaction as cases belonging to the main "*OX19*" sub-group. Further, the Proteus

reactions do not differentiate between louse-borne and flea-borne typhus, whereas the truly specific Rickettsial agglutination and complement-fixation reactions do so, and also appear to correspond with the classification based on the arthropod vectors. Those who insist on having a classification based on the characteristics of the causal Rickettsiae will not be likely to accept a non-specific agglutination response as a suitable basis.

In the table the louse-borne and flea-borne typhus fevers of South Africa are shown as occupying the very anomalous position of belonging to the "Indeterminate sub-group" although the typhus fevers transmitted by the same insects in all other parts of the world belong to the "*OX19*" sub-group. It is worth noting, however, that GEAR as a result of his own investigations maintains that these fevers in South Africa are identical in all essential respects, including their serological reactions, with corresponding fevers elsewhere and so conform to the classification according to the arthropod vectors.

Recent work has strengthened the opinion that each of the four arthropod-borne main types of typhus fever constitutes an essentially unitary type, whether considered from the aetiological, clinical, or epidemiological point of view. The variations that occur in each type are not generally regarded as amounting to specific differences, with the possible exception of the tick-borne Q fever whose status has not yet been finally established. *John W. D. Megaw.*

BRIDGES, R. F. **Note on the Preparation of Suspensions for the Weil-Felix Test.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Mar., v. 37, No. 5, 343–4.

This paper is a suitable complement to the article abstracted above; it contains a concise description of the methods now employed at the Standards Laboratory in the preparation of *Proteus* suspensions for the Weil-Felix tests.

The paper must be read in the original text by laboratory workers; it does not contain a superfluous word.

The general lines of the technique are as follows: From a selected 24-hour colony of a pure O-strain a broth culture is made and is used after 24 hours' incubation to inoculate a large agar surface.

The growth, after 24-hours' incubation, is washed off with a little saline, filtered through cotton wool, and treated with 96 per cent. alcohol, which is added in the proportion of four volumes to one volume of the suspension. The mixture is well shaken for one hour, then the alcohol is removed by a combined process of decantation, centrifugation, and pipetting. For *OX19* and *OX2* the remaining deposit of organisms is suspended in sterile saline in screw-capped bottles and shaken till no trace of granularity remains.

A 2 per cent. solution of buffered formol-saline is added to make a 0·25 per cent. concentration of formalin and the suspension is standardized by adding more saline and 2 per cent. buffered formol-saline to produce a density equal to that of 4,500 million *Bact. coli* per ml., and a formalin concentration of 0·25 per cent.

For *OXK*, distilled water instead of sterile saline is used for re-suspending the alcoholized organisms, and all further dilution is made with distilled water. But the 2 per cent. formalin may be added in the form of buffered formol-saline as in the case of the other organisms.

John W. D. Megaw.

SANCHO LOBO, M. Notas sobre una epidemia de tifus exantemático. [**Notes on an Epidemic of Typhus Exanthematicus.**] *Med. Española.* 1943, Sept., v. 10, No. 56, 321–33, 4 graphs. [Bibliography.]

This note deals with an epidemic of louse-borne typhus in Cordova in 1942. As so often happens the first cases were missed; they were mistaken for influenza, so that the epidemic had got well under way before control measures could be initiated.

Even during the epidemic many of the milder cases must have been missed owing to concealment, prompted by fear of irksome restrictions.

Some of the features of the 47 cases treated in hospital by the author were as follows:—The fever curve usually showed a gradual decline, with moderate daily remissions, from the end of the first week.

The rash varied from a few inconspicuous roseolae to abundant large haemorrhagic macules. In three cases no rash was seen.

There was vomiting at the onset in 16 cases.

A special feature was the occurrence of a bilateral tender spot at the outer borders of the recti muscles above the level of the umbilicus. This was observed in all the cases, and in nearly all there was also defensive rigidity on pressure over the recti muscles above the umbilicus, whereas the lower part of these muscles remained flaccid.

The Weil-Felix reaction was uniformly negative during the first week; in four cases only it was positive on the 11th or 12th day; in three it was negative on the 13th to the 15th day, and positive on the 17th to the 19th day. In one case it was negative on the 10th and 16th days and reacted on the 28th day at a titre of 1–500. In only one of the surviving cases it was persistently negative, being tested on the 18th and 30th days.

Completely negative reactions were frequent in the fatal cases [presumably because the patients did not survive long enough]. The maximum titre observed was 1–1,000.

The severity of the attacks ranged from inapparent or very mild to fulminating and rapidly fatal; the former were in young children who belonged to affected families. There were eight deaths (17 per cent.); of these five were in persons between the ages of 60 and 83; the ages of the three other patients who died were 25, 40 and 42.

Many drugs were tried but none appeared to influence the course of the disease except for temporary benefit from strychnine, camphor, and serum. The kind of serum used is not stated.

John W. D. Megaw.

LARSEN, K. & LEBEL, H. **A Small Laboratory Epidemic of Typhus Fever in Copenhagen.** *Acta Med. Scandinavica.* 1943, v. 115, No. 5, 524–36, 5 figs. [12 refs.]

A description is given of four cases of laboratory infection [apparently at the State Serum Institute, Copenhagen] in persons who had been working in a room in which mouse-lung vaccine was being prepared from *Rickettsia prowazeki*. Two of the patients had been engaged in the preparation of the vaccine and had been exposed to droplet infection resulting from the explosive expiratory efforts of the mice during intranasal instillation of the infective material; the other two had been working in a room in which the infected lungs of the animals were being ground with sand in a mortar. One of the latter pair of patients had not been vaccinated against typhus fever; he had

a severe attack, typical in all respects, and with a Weil-Felix titre rising from 0 and reaching 1–400 on the 13th day, and 1–6,400 on the 18th day.

The attacks in the other patients who had been vaccinated were mild; in one the Weil-Felix reaction was negative throughout; in another the titre was 1–50 on the 10th day, and 1–100 on the 13th day, having been 0 on the 7th day. In the fourth case the titre rose to 1–400 on the 13th day, having been 1–100 on the 9th day. In this last case there was only slight fever lasting three days.

From a consideration of these cases and a study of the literature the authors incline to the view that low titres and negative reactions are more likely to occur in vaccinated than in unvaccinated persons.

Droplet infection is regarded as the most likely explanation, especially in the first two cases; other possibilities are, "getting infected material on their hands" or inhalation of infected dust resulting from the drying of droplets caused by the grinding process.

Unfortunately two guineapigs, which had been inoculated intraperitoneally with blood from two of the patients, had to be destroyed because the authorities of the State Serum Institute would not allow them to be kept on the premises. [This was a great pity because more light is needed on the very important question whether Rickettsiae can be transmitted from persons suffering from attacks modified by previous vaccination.]

The authors remind us that most of the workers engaged on experimental work with typhus Rickettsiae contract typhus fever, sooner or later. RICKETTS and v. PROWAZEK died of the disease, and ZINSSER, MOOSER, NICOLLE, and DA ROCHA LIMA, were among those who became infected.

The only other laboratory epidemic due to *R. prowazeki* that has been recorded was the one reported by CIUCA *et al.* in Rumania; all the others were caused by *R. mooseri.* *John W. D. Megaw.*

HEIMBERGER. Beobachtungen bei Fleckfieber. 3. Mitteilung. Echtes Rezidiv oder Verlauf in Schüben? 4. Mitteilung. Der protrahierte Kollaps. 5. Mitteilung. Versuche mit Pervitin. [**Observations on Typhus. 3. True Relapse? 4. Prolonged Collapse. 5. Effect of Pervitin.**] *Deut. med. Woch.* 1943, Nov. 12, v. 69, No. 45/46, 775–6, 2 figs.; 777–9, 3 figs.; 779, 4 figs.

This paper is in continuation of one briefly referred to [this *Bulletin*, 1944, v. 41, 384] on the subject of clinical observations of typhus fever.

The first matter dealt with in the present article is the question whether relapses ever occur in the disease. Two cases are described as being possible examples of relapses; they were the only ones of the kind in a series of more than 400 seen by the author.

In one there was a mild attack of fever lasting seven days in which there was a fleeting and scanty roseolar eruption and a Weil-Felix reaction at a titre of 1–100 on the 10th day. After 14 days of freedom from fever the patient had a second febrile attack complicated by bronchopneumonia, and ending with death on the 19th day.

The other patient had a relatively mild attack of fever lasting 13 days and ending by a very prolonged slow lysis; there was a scanty roseola, and the Weil-Felix reaction is stated to have been "positive" but the

titre is not specified. After four days' absence of fever a second severe attack occurred and the patient died on the 13th day.

The author discusses the question whether these were examples of genuine relapses or something that he calls "*Verlauf in Schüben,*" which seems to mean a two-phase type of febrile course such as occurs in a number of "other virus diseases" such as dengue. [There are two weak points in the discussion; one is that the information supplied hardly justifies the assumption that the attacks of fever were proved to be typhus; only one Weil-Felix test was carried out in each of the cases, the titre in one case was 1–100, and in the other it was not stated; no blood cultures or other laboratory investigations into the causes of the fevers were done. The other weak point is that typhus is not one of the fevers caused by a filter-passing virus.]

The next subject dealt with is the occurrence of prolonged collapse in typhus fever; this is often accompanied by an anomalous fall in the temperature by lysis; the circulatory failure does not respond to drugs like adrenaline or pituitrin, and the prognosis is very unfavourable.

The third matter discussed is the treatment of collapse in typhus fever by "pervitin," which was tried in 47 cases in the hope that its known action as a nerve-cell stimulant might yield better results than cardiovascular stimulants like strophanthin.

The drug seemed to be useful in some of the cases in which it was given early in the collapse, but the author admits that a decision whether to give or withhold the drug in cases of threatened collapse must remain a matter of personal opinion on the part of the physician.

John W. D. Megaw.

MORAGUES, V. & PINKERTON, H. **Fatal Murine Typhus Infection in the dba Strain of Mice, with Observations on Strain Variation in Susceptibility.** *J. Exper. Med.* 1944, Jan. 1, v. 79, No. 1, 35–40.

The experiments recorded in this and the following paper show that mice inoculated with a given dose of murine-typhus Rickettsiae may develop either an inapparent illness or a disease with 100 per cent. mortality, depending on the strain of mouse used and the environmental temperature at which the mice are kept; they may thus explain the conflicting results obtained by various workers with murine strains in mice.

The strains of mice used in most of the experiments are described as "dba" and "Swiss" strains; the former was an inbred strain, the latter was pen-mated.

Of 53 dba mice inoculated by the intracerebral route with a typical murine strain of Rickettsiae from Mexico, 28 died within five to six days of severe Rickettsial infection, and some of these had a Rickettsial meningo-encephalitis which was serially transmissible. All the mice became seriously ill.

Of 33 Swiss mice inoculated with the same material and in exactly similar conditions none died, and only three became ill. The room temperature in both cases was 60–80°F.

In another set of experiments mice were inoculated intraperitoneally with infected brain substance and kept at a temperature ranging from 67–73°F. In this all the 42 dba mice died in six to seven days, and 10 of 16 Swiss mice died in six to 11 days.

Two other strains of mice, "A albino" and "brown agouti," corresponded with the Swiss strain in their tolerance of infection.

John W. D. Megaw.

MORAGUES, V. & PINKERTON, H. **Variation in Morbidity and Mortality of Murine Typhus Infection in Mice with Changes in the Environmental Temperature.** *J. Exper. Med.* 1944, Jan. 1, v. 79, No. 1, 41–3.

In the above experiments it was found that the environmental temperature conditions had a pronounced influence on the course of the infection.

This influence was clearly shown by experiments on 44 dba mice inoculated by the intraperitoneal route with identical doses of the same infected material. One lot of 22 was kept at 65–73°F. and all the mice died. Among the other 22 kept at 85–98°F. only two died and 10 others had light infections.

The influence of temperature on 61 other mice was analysed, and although the conditions were not strictly comparable it was found that the average severity of the disease resulting from given types of inoculation varied inversely with the height of the atmospheric temperature within the ranges employed for the tests. For example, 4 of 13 dba mice died when kept at 85–98°F. after heavy intraperitoneal inoculation, whereas all of 18 dba mice died after a correspondingly heavy, though not identical, inoculation, when kept at 70–80°F.

The bearing of the experiments on the treatment of typhus fever in man is discussed, and while it is suggested that the febrile reaction in man is likely to bring the body temperature to the optimum level it is also pointed out that the specially abundant multiplication of Rickettsiae in the skin may be due to the relative lowness of the surface temperature, and that a high external temperature may be found to inhibit the development of the organisms.

CLAVERO and PEREZ (1941) have suggested that the severe reactions and deaths from Blanc's vaccine in Chile might be due to climatic conditions.

The authors suggest that by using different strains of mice and controlling the environmental temperature it may be possible to secure conditions in which any desired degree of mortality will result from inoculation with murine typhus, and that such conditions will have obvious advantages in estimations of the value of therapeutic measures in typhus infection. *John W. D. Megaw.*

DERRICK, E. H. **The Epidemiology of Q Fever.** *J. Hygiene.* 1944, Apr., v. 43, No. 5, 357–61, 1 fig. [18 refs.]

This paper consists of a fully-documented summary of the results of the investigations into the transmission of Q fever in Queensland up to the suspension of the enquiry in 1942.

The disease, which was known to be prevalent among meat workers in Brisbane, was described by Derrick in 1937 [this *Bulletin*, 1938, v. 35, 62] as a new fever entity, and was given the name Q fever. In the same year BURNET and FREEMAN [this *Bulletin*, 1938, v. 35, 63, 835] described the causal Rickettsia, *R. burneti*; and in the following two years these three workers, with SMITH and BROWN, devised animal-inoculation and agglutination tests for its diagnosis. All the above-named workers collaborated in the further research into the transmission of the disease [see this *Bulletin*, 1940, v. 37, 253, 563, 851; 1941, v. 38, 208, 447, 690; 1943, v. 40, 302, 388, 601].

Between September 1935 and August 1942, 176 cases were recognized; all but two of the patients were males between the ages of 10 and 64 years. There were three deaths.

The disease was confined to a strip of coast in south-east Queensland; 129 of the patients lived in Brisbane, and all but six of these were associated with two meat works, at the larger of which there were 116 cases among about 942 employees. By far the highest incidence was among meat inspectors whose special susceptibility was believed to be due to their having recently entered the zone of risk, so that they had probably not suffered from previous attacks. All classes of employees were attacked, including carpenters, visiting truck drivers, a laundryman, and an electrician. The incidence was haphazard and spasmodic, and was not seasonal.

The most plausible explanation of the peculiar incidence of the disease was that infection was acquired by the inhalation of dried faecal dust from infected ticks, as had already been suggested by HORNIBROOK and NELSON [this *Bulletin*, 1941, v. 38, 691] in the case of a laboratory outbreak of American Q fever at the National Institute of Health, Washington. Four laboratory workers at Brisbane were attacked, possibly in the same way.

Of the 47 rural patients, 32 lived or worked on dairy farms; the others were associated with conditions of life in farms and forests.

There was no evidence of man-to-man transmission in any case.

Three of 103 bandicoot rats (*Isoodon torosus*) were found to be naturally infected, also 6 of 502 ticks (*Haemaphysalis humerosa*), from the affected area. By agglutination tests evidence of previous infection was found in 39 of 180 bandicoot rats, and in 14 of 984 cattle in the area.

All species of bush animals tested (7 rodents and 3 marsupials) were found susceptible to experimental inoculation.

In addition to *H. humerosa*, which does not bite man, three other ticks, *H. bispinosa*, *Rhipicephalus sanguineus*, and *Ixodes holocyclus*, were found to be potential vectors.

Natural transmission of infection was thought to be chiefly as follows:—Rat to rat, by *H. humerosa*, and probably by *I. holocyclus*; rat to man, and rat to cattle, by *I. holocyclus*; cattle to cattle, by *H. bispinosa*; cattle to man, by *Boophilus annulatus microplus* and *H. bispinosa*.

The dog tick *R. sanguineus* was thought to be a potential vector from dog or cattle to man.

Transmission from ticks to their offspring through the egg was not found to occur.

[The valuable research summarized in this paper is important not only because of its bearing on the problem of the arthropod-borne Rickettsial infections, but also because Q fever, and perhaps other related fevers, may be found to have a wide distribution and to have escaped recognition up to the present time. All the work referred to in the paper has already been dealt with in this *Bulletin*, but it is believed that the above summary will be found useful. It is to be hoped that the enquiry will be resumed after the war.]

John W. D. Megaw.

ERNST, K. & PORTIUS, W. Neurologische Beobachtungen bei Wolhynischem (Fünftage-) Fieber. [**Observations on the Neurological Features of Trench Fever.**] *Klin. Woch.* 1943, Nov. 13, v. 22, No. 46/47, 692–5.

This paper contains a long list of the nervous manifestations observed in trench fever.

During the period of prevalence of the disease in 1942, many cases of nervous disorders of very varied types were seen by the neurological specialists. These included: unexplained headache, supraorbital and occipital neuralgia, pareses, disturbances of sensation; cases simulating multiple sclerosis, tabes, encephalitis, myelitis, poliomyelitis, cerebellar ataxy, epilepsy, various psychoses, neuroses, exhaustion states, neurasthenia, and malingering. In occasional cases the features were suggestive of peptic ulcer, pneumonia, malaria, cystitis, renal calculus, etc. Still other cases were seen in the Ear, Nose, and Throat Departments with symptoms pointing to tonsillitis or sinusitis, and at the Eye Department with complaints of visual disturbances or intolerance of light.

In some of these patients the diagnosis of trench fever was obvious, but in many others the association with the disease was not suspected; partly because the younger generation of physicians were not familiar with trench fever, and partly because in a brief period of observation there was no opportunity for observing the recurring type of fever with its four to six-day periodicity.

Often, but not always, the characteristic triad, regularly recurring febrile paroxysms, severe headache, and pains in the limbs, especially in the shin bones, was observed. With increasing experience of the disease such features as the facial expression of the patients and the occurrence of a relative lymphocytosis gave useful clues to the diagnosis.

The pains have been explained by different observers in various ways, such as vascular disturbance, rheumatic-neuralgic syndrome, lesion of the lumbar plexus and spiral-nerve roots, myelitis, and toxic neuritis.

Most of the patients had the usual type of pains, chiefly in the legs and especially in the shin bones, but also in the arms in some cases. The joints were sometimes painful and there might be localized points of tenderness in the muscles. In some cases there was a pronounced feeling of coldness in the legs. Superficial disturbances of sensation were easy to detect in many cases by simple methods of examination, sometimes these were restricted to one side of the body.

The pains were occasionally referred to the internal organs and were suggestive of lesions of the tonsils, respiratory tract, heart, bowels, or kidneys.

Supersensitiveness to light or sound, and flashes of light in the eyes, were other occasional features. Several types of motor disturbances of the ocular muscles, nystagmus, and irregularities in the reaction of the pupils, were observed.

In some cases the gait was unsteady, verbal articulation might be impaired, and psychical disturbances were not uncommon.

The only change in the fundus oculi was occasional redness of the papilla.

In 11 patients suboccipital puncture was performed because of the suspicion of encephalitis; in five of these the cell count of the cerebrospinal fluid was increased to about 30 to 35, and in two the fluid was under increased pressure of about 200 mm. The Pandy reaction was positive in all these cases.

Insomnia was frequent, even in the absence of pain. Occasionally there was mental confusion. Apathy or a depressive hypochondriac mental state was common. Some patients were so demonstrative in their complaints as to suggest exaggeration or even malingering.

Little is known of the pathological anatomy of the disease, but it is suggested that there may be a moderate degree of toxic damage to the blood vessels with special localization in the brain and spinal cord.

John W. D. Megaw.

WINDORFER, A. Zur Behandlung des Wolhynienfiebers. [**The Treatment of Trench Fevers.**] *Deut. med. Woch.* 1943, Nov. 26, v. 69, No. 47/48, 805–7.

During the present war the duration and types of attacks of trench fever have been so varied that it is exceedingly difficult to form a reliable estimate of the effect of any special form of treatment.

The author was unable to carry out tests on alternate cases, but he selected patients who had severe attacks.

He found that the usual antineuralgic drugs had to be given in repeated doses, sometimes up to six daily, and that they had no effect on the course of the illness.

" Omnadin " was the drug selected for special trial in view of its supposed action in stimulating the defensive mechanism of the body. Patients were kept under observation for a few days, and when no improvement was observed injections of " Omnadin " were given. The doses used were, 4 cc. daily for three days, then 2 to 4 cc. on alternate days up to a total of about 10 injections.

An unexpected result was that a dose given in the afternoon caused great relief of the pain, beginning in one or two hours and lasting till the next evening. There was also a decided improvement in the general condition.

It is stated that the leucocyte count showed a definite increase, beginning soon after the injection, but no reference is made to the use of controls to exclude the occurrence of diurnal variations.

The treatment was given to 65 severely affected patients, in most of whom the pains were greatly relieved and the duration of the illness was believed to have been shortened, though no influence on the number of the recurrences could be proved.

In the cases of failure it was noticed that the number of the leucocytes was not increased.

Other methods of treatment that had been tried were unsuccessful; these included autohaemotherapy, injections of bismuth, and injections of vitamin B.

In several cases intercurrent diseases—such as malaria, diphtheria, and typhus fever—arrested the course of the disease, but artificial pyrotherapy had no effect.

Psychotherapy and occupational therapy were very helpful. Transfers from one hospital to another should be avoided. During convalescence " sympatol " [synephrin], and vitamin C intravenously, in doses of " 5 cc. ", daily were useful.

[Omnadin is a mixture of albuminous bodies, lipoids and animal fats, given to produce a non-specific stimulation of antibody formation.]

John W. D. Megaw.

BARTONELLOSIS.

MAYER, M. Sobre la etiologia de las bartonellosis especialmente de la fiebre de Oroya. [**On Oroya Fever and the Bartonelloses.**] *Rev. Sanidad y Asistencia Social.* Caracas. 1941, Dec., v. 6, No. 6, 863–73, 3 figs. [16 refs.]

A " Conference paper " clearly and interestingly written, treating of *Bartonella* and the bartonelloses in man, in the dog and the mouse, by one who has himself done much work on the subject. He traces the history of the disease from the time of the writings of Zarate in 1543 on cases of " *berrugas* " at the time of Pizarro's conquest of Peru down to Patiño's description of Guaítara fever in 1939 [see this *Bulletin*, 1940, v. 37, 271, 582, 583 ; 1941, v. 38, 209, 695]. Nothing fresh is brought forward, but in view of the fact that no satisfactory treatment is at present known, the author pleads for further research, chemical and otherwise, for discovery of a remedy. *H. Harold Scott.*

LASTRES, J. B. & ANGLAS QUINTANA, P. Sindrome de paraplejia espastica en la verruga peruana. [**Spastic Paraplegia complicating Verruga peruviana.**] *Rev. Neuro-Psiquiatria.* Lima. 1943, v. 6, No. 2, 192–204.

This contribution is of particular interest because text-books make no mention of nervous diseases complicating verruga or Oroya fever. As long ago as 1895 ODRIOZOLA and CASTILLO reported the case of a man, 37 years of age, with Bartonella infection who suffered from spinal pain, weakness, pain in the legs, giddiness, tremor of the hands and arms, and ORDRIOZOLA stated that Carrión's disease may cause neuritis and obstinate neuralgia. In 1936 Lastres recorded a case of verruga with anterior poliomyelitis.

The case recorded in the present paper was in a man of 24 years who was suddenly seized with a shivering attack, thought to be influenzal. After six weeks' treatment he left hospital, although he did not feel by any means well. In another four months, during which he felt vaguely ill, he had a return of chills and fever, with nausea and vomiting and was mentally dull ; his legs felt weak and he had to use a stick for walking. Verruga nodules appeared and the symptoms of this disease were quite clear and typical. Then very definite paraplegia set in, at first flaccid but soon becoming spastic. The verruga condition got better, running its usual course, but the paraplegia did not clear up—in fact, it also ran the usual course. Superficial sensation was not affected, but deeper, vibratory sensation was lost on both sides ; there was no involvement of sphincters ; ankle and knee clonus were marked. Wassermann and Kahn tests proved negative. He had been under observation for nearly two years when last reported upon and though there may have been a little improvement, this may have been apparent only. He still had to use sticks for walking. [Though not mentioned in text-books, it is presumably possible that a nodule or a haemorrhagic focus might involve the spine or meninges in the same way as the mucous membranes and so give rise to these nervous system complications.] *H. Harold Scott.*

HOWE, C. & HERTIG, M. **Prophylactic Immunization against Carrión's Disease.** *J. Immunology.* 1943, Dec., v. 47, No. 6, 471–82, 2 figs. (1 map.)

Though the possibility of immunization by vaccines against Carrión's disease has been mentioned, no actual investigation has hitherto been reported. The establishment of military guards at certain bridges on the Central Railway of Peru in the verruga zone afforded an opportunity of which the author took advantage. The vaccine was prepared from four strains of *Bartonella bacilliformis,* three from Oroya fever patients and one from a sandfly, grown on Geiman's proteose blood agar [see this *Bulletin,* 1944, v. 41, 209]. Twenty-one guards were bled for serum and culture on the day of departure for their posts and each received 1 ml. of the vaccine; a week later 19 were given a second injection and 2–3 weeks later six received a third inoculation. Prior to the first inoculation, haemoculture was negative in all cases and none of the sera contained agglutinins for *B. bacilliformis.* Within 17 days of exposure to infection, 13 had sera which agglutinated, but the blood-cultures were still negative. Later observations revealed that 12 of the original 22 inoculated developed positive blood-cultures and presented symptoms of infection—slight fever, chills, headache, bone- and joint-pains, and five showed an eruption, scanty in three of them. Generally, the symptoms were mild and rarely caused interruption of military duty. Two had to go to hospital but one only was kept in for any length of time, over one month. Comparison is drawn between these guards and those of the preceding 18 months, none of whom had been vaccinated. Three-fourths of one group of unvaccinated guards had contracted the disease during one month's exposure, and nine-tenths of another group became infected during four months' exposure, two-thirds of the latter being incapacitated with fairly severe illness. It is shown that vaccination does not prevent infection, but does definitely moderate the severity of the disease. *H. Harold Scott.*

DENGUE AND SANDFLY FEVER.

i. ENRIGHT, J. R. **Dengue Fever: I.** *Hawaii Med. J.* 1943, July-Aug., v. 2, No. 6, 293–5.

ii. NANCE, F. D. **Dengue Fever: II. Review and Report of Three Cases.** *Ibid.,* 295.

i. An analysis is given of certain features of 141 cases of dengue fever which occurred among civilians in Honolulu in 1943.

Most of the patients were treated in their own homes, the others were seen in hospitals. The data were obtained from various sources and the significance of the figures shown under the headings "doubtful" or "no history" cannot well be estimated.

Some of the findings are shown in the table:—

	Positive	Negative	Doubtful	No history
Primary rash (erythematous flush)	40	27	18	56
Terminal rash (with second rise of temperature)	87	11	1	56(?42)
Headache (behind eyeballs or occipital)	109	3	0	29
Post-orbital pain (chiefly on movement of eyes)	95	7	2	37
Upper - respiratory symptoms (mostly sore throat, seldom coryza)	15	93	2	31
Saddle-back fever curve (including cases with afebrile interval) ...	53	14	11	63
Backache (usually severe) ...	101	7	0	33
Depression (rarely severe) ...	32	52	4	53
Adenitis (occipital or posterior cervical)	9	34	0	98

Nausea and vomiting were frequent, but were usually associated with the taking of drugs, such as sulphonamides, codeine, barbiturates, and aspirin. Leucopenia with relative lymphocytosis was pronounced in most cases about the second or third day. The average total count was 4,200 ; the extremes were 1,450 and 7,500.

In patients who had been vaccinated against typhoid fever there was often a positive Widal reaction ; the titre sometimes rose as high as 1,320 during the fever, it fell rapidly during convalescence.

ii. A typical case is described. The author has the impression that cases seen by him in the subtropical climates of Honolulu and Shanghai were less severe than those seen in the tropics, headache and backache being often absent.

[In the same number of the Journal L. Clagett Beck states that no cases of dengue had been officially reported in Hawaii since 1912, though occasional cases had been seen by physicians during the past 30 years.] *John W. D. Megaw.*

Mochkovski, C. [=S.]. Sur un symptôme retrospectif de la fièvre de trois jours (fièvre pappataci). [**A Retrospective Symptom of Sandfly Fever.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1937, v. 6, No. 1, 104–6, 2 figs. [In Russian. French summary 106.]

The author draws attention to a characteristic symptom observed in persons who have recovered from sandfly fever. In such persons there appear, after some time, transverse furrows on the finger nails, which are disposed at varying distances from the base, according to the length of time since recovery took place. The furrows usually affect the nails on all fingers but are especially marked on the thumbs. When well defined, they have a breadth of 1–1½ mm., and their anterior margin is steeper than the posterior one. This lesion is produced by a thinning of that part of the nail which had developed during the disease, pointing to a disturbance in the growth of the nails during that period. It can serve as a subsidiary symptom for the retrospective

diagnosis of sandfly fever, though its differential diagnostic value requires further study. *C. A. Hoare.*

MOCHKOVSKI, S. D., DIOMINA, N. A., NOSSINA, V. D., PAVLOVA, E. A., LIVCHITZ, J. L., PELS, H. J. & ROUBTZOVA, V. P. [**Researches on Sandfly Fever. Part VIII. Transmission of Sandfly Fever Virus by Sandflies hatched from Eggs laid by Infected Females.**] *Med. Parasit. & Parasitic Dis.* Moscow, 1937, v. 6, No. 6, 922–37. [In Russian.]

From the available data it is evident that the virus of sandfly fever is not retained in the human body during the interepidemic period and, therefore, the source of each outbreak of the disease must be sought elsewhere. WHITTINGHAM and ROOK believed that the sandfly larvae became infected by ingestion of the faeces or dead bodies of females, and that a newly hatched imago was incapable of transmitting the infection until it had its first blood meal, which activated the virus. Since these views did not afford a satisfactory explanation, the authors carried out a series of experiments to determine whether the virus is transmitted to the offspring of *Phlebotomus papatasii* through the ova. Female sandflies (15,331 divided into 47 batches) were fed on patients during the infective period of the disease (not later than 20 hours after the onset of fever), and 2–3 days later they were allowed to have another meal on the patients. Those that survived to the 6–7th day were fed for the third time. By transferring the insects to new receptacles and collecting the eggs found in these it was possible to determine the time when they were laid. The offspring of the females fed in the endemic area were transported to Moscow for the final tests. The presence of virus in the new generation was determined both for the larvae and the adults. In the former case 200 larvae, hatched from eggs laid six days after the first feed of the females, were washed in sterile Ringer solution and then emulsified. The emulsion was injected subcutaneously into two volunteers but produced inconclusive results.

As regards the adult female sandflies these were allowed to feed on 24 volunteers. Thirteen of these were bitten by insects hatched from eggs which had been laid one to five days after the infecting feed of the parent sandflies. None of these persons showed any evidence of infection, direct or indirect (inoculation of their serum). The remaining eleven volunteers were bitten by sandflies derived from eggs, some of which were laid between the 6th and 8th day after the infecting feed of their mothers. While in six persons of this group there was no reaction, five others showed the typical clinical manifestations of sandfly fever which developed after an incubation period characteristic of this disease. Inoculation of other volunteers with the blood of these patients, taken at the beginning of the pyrexial period, also produced infection.

These experiments have demonstrated (1) the transovular transmission of the virus of sandfly fever to the offspring of sandflies; (2) that the infection is transmitted to man by the bite of those females of the second generation which had hatched from eggs laid by the parent-insect 6–8 days after the infecting feed.

In one of the positive experiments infection was produced by the bites of newly hatched sandflies, showing that the virus in these insects is transmissible without activation by a previous blood meal.

C. A. Hoare.

LIVSHITZ, J. M. Recherches sur la fièvre pappataci. Mémoire IX. Matériaux sur l'immunologie de la fièvre pappataci. [**Researches on Sandfly Fever. Part IX. Immunity in Sandfly Fever.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1937, v. 6, No. 6, 938–43. [In Russian. French summary 943.]

During the expedition for the study of sandfly fever in 1937 the author made a number of observations and experiments on immunity in this disease, the results of which are recorded in this paper. Practically 100 per cent. of persons not previously exposed were found to be susceptible to infection, both experimental and natural. Thus, 40 volunteers inoculated with virulent serum all became infected, while of 65 mental patients similarly inoculated, 75·3 per cent. acquired an infection. Since in the latter group no data were available regarding previous contact with the disease, it is thought that some of the non-susceptible patients may have been immune. The incidence of natural infection was observed in 1,076 persons who were newcomers in the endemic area. About 50 per cent. of these were subsequently admitted to hospital with sandfly fever. It is reckoned that many more were actually infected but these did not report for treatment, since their temperature was below 37·5°C. The following results were obtained in observations on acquired immunity. Of 416 persons who had recovered from a natural infection, 22·8 per cent. became infected the second time, while 0·9 per cent. were reinfected the third time in the course of the same epidemic season. Furthermore, of 22 volunteers who had recovered from an experimental infection, nine became naturally infected during the same season. Among 86 vaccinated persons the rate of reinfection was 34·8 per cent. Other observations concern a group of 30 persons, all residents in an endemic area: 18 of these had sandfly fever 3–4 years previously, whereas 12 denied previous infection. In this group 70 per cent. did not react to experimental inoculation of the virus, 16·6 per cent. reacted feebly, while 13·3 per cent. became infected. In another experiment eight mental patients who had recovered from an experimental infection were successfully reinfected 1–3 months later.

From all these observations it is concluded (1) that a single infection may afford protection for a period of 1–3 months; (2) that of persons who had recovered from sandfly fever not less than 20 per cent. could be reinfected in the course of the same epidemic season; (3) that there is a high degree of immunity in persons resident in endemic areas.

C. A. Hoare.

PLAGUE.

i. KAMAL, A. M. **On the Epidemiology of Plague in Assiut Province in the Years 1938–1939.** *J. Egyptian Pub. Health Ass.* 1941, Jan., 1–30.

ii. ——, GAYED, I. & ANWAR, M. **On the Epidemiology and Treatment of Plague in Egypt. "The 1940 Epidemic."** *Ibid.* 31–103, 8 maps, 2 graphs, 41 charts & 3 photos.

iii. —— & GAMAL EL DIN EL HEFNY, A. **Rats in Egypt, and the Effect of Local Squill (Urgina-Scilla-Maritima).** *Ibid.* 105–29, 8 figs. Appendices I and II. 139–46, 1 sketch & 19 figs.

Articles which have already appeared in the Journal of the Egyptian Public Health Association, 1941, are here combined in a booklet

reprint. They refer to plague epidemiology, symptomatology and treatment in general with some application to the Assiut Province. Some of the points may be extracted from these three articles.

i. Egypt is endemically infected with plague and as cases occur nearly every year it must presumably be regarded from the point of view of a potentially epidemic centre. Epidemic characters may prevail in one province or another from time, to time and discussion in this first paper relates to the Assiut Province for the years 1938–1939. A special contention of the author is that the pigeon houses built on the roofs of dwellings are very attractive to rats and thus indirectly contribute towards the prevalence of rat plague.

ii. The incubation period of plague is a datum of considerable importance and put down by international convention as six days. According to the authors this period should be extended. Their experience was of " cases appearing in contacts left in their homes on the 13th day." They have to admit, however, that " it is very difficult to rule out a new infection." Treatment by serum was well tried out and the dosage was high—not less than 80 cc. daily and in some cases intravenously. A trial was also made of sulphapyridine : 2 gm. on admission followed by 1 gm. in two hours and then 1 gm. every four hours. Finally, it seems to have been decided from the figures that a combined treatment of serum and sulphapyridine was the most successful.

iii. Some interesting observations and some correspondingly interesting illustrations of the rat in Egypt are among the subject matter of this third paper. In ancient times the Egyptians worshipped the enemies of the rat and this is apparent on their sculptured monuments. Among the enemies were the cat and the snake. Most proprietors of food stores at the present day in the Egyptian port towns keep ferrets, which are easily domesticated, to kill rats. In this article also there is reference to the use of a local squill preparation *Urginea* (*Scilla*) *maritima* in place of the usual raticide. Experiments have shown it to be effective and, of course, it is cheap. It has also been found to be less poisonous to chickens and rabbits than the foreign squill. Baits containing 5 per cent. squill powder are used.

Two appendices are attached, one a résumé of the routine anti-plague measures adopted in Egypt, and the other on data of plague investigation. *W. F. Harvey.*

ROUBAUD, E. & GIRARD, G. Observations sur deux pulicides de la faune de Madagascar. [**Two Fleas of the Fauna of Madagascar.**] *Bull. Soc. Path. Exot.* 1943, Oct. 13, v. 36, No. 9–10, 279–81.

The two fleas in question are *Paractenopsyllus kerguisteli* described by WAGNER, and *Synopsyllus fonquernii* described by WAGNER and ROUBAUD. The first of these was found originally on dogs and domestic rats, is closely allied to *Ctenopsyllus musculi* [*Leptopsylla segnis*], and is more widely distributed as an ectoparasite than was at first realized. It has been recognized on an insectivore of a collection made as far back as 1910, *Orizoryctes tetradactylus*. There is good reason to believe that this flea infests many species of mammals in the forest region of Madagascar. The same applies to *Synopsyllus fonquernii* which was originally identified on a small lemur *Microcebus myoxinus*, but has now had its infestation range extended to other mammals. These fleas, the

authors consider, may be factors in local epidemiology and vectors of sylvatic plague. *W. F. Harvey.*

CARTER, C. L. **Bubonic Plague on the Island of Hawaii.** *Hawaii Med. J.* 1943, July-Aug., v. 2, No. 6, 296–8.

An account of the clinical features.

KEYS, T. E. **The Plague in Literature.** *Bull. Med. Library Ass.* 1944, Jan., v. 32, No. 1, 35–56, 1 fig. [47 refs.]

BACILLARY DYSENTERY.

DREYFUSS, F. & GUREVITCH, J. **Serological Examination and a Cutaneous Test in the Diagnosis of Bacillary Dysentery.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Feb., v. 37, No. 4, 263–70, 1 fig.

The authors state that the laboratory diagnosis of bacillary dysentery is beset with difficulties associated particularly with the poor viability of the organism outside the body. They carried out agglutination and skin tests in 26 cases of bacillary dysentery (the causal organism was isolated in 16), and in a control series consisting of 12 cases of enterocolitis, 8 cases of amoebic dysentery, 5 of spastic colon, 7 of ulcerative colitis, and 11 cases of various other disorders. A titre of 1/100 was accepted as diagnostic in agglutination tests for Flexner infections, and was present in 20 of the 25 Flexner dysenteries, but not before the 7th to 10th day of infection. A positive reaction was also given by a small proportion of the control series. The skin test consisted in the intradermal inoculation of 0·1 cc. of a Flexner vaccine containing 50 million organisms per cc. A positive reaction consisted of local infiltration and redness, sometimes exceeding 3–4 cm. in diameter, but, as small and doubtful reactions were common in the control series, this test is probably of little practical value. [The authors seem to be unaware of the value of desoxycholate-citrate agar which allows bacteriological diagnosis of bacillary dysentery in practically 100 per cent. of cases.] *Robert Cruickshank.*

JANA, A. P. **A Study of "Choleriform" Disease in the Typhoon Area of Contai.** *Indian Med. Gaz.* 1943, Dec., v. 78, No. 12, 597–8.

About two weeks after a cyclone had struck the district of Contai, during which all the tanks, wells and pools were polluted by vegetation and animal carcases washed into them, there occurred an outbreak of a disease which clinically resembled cholera, except that rice-water stools were rarely seen. Generally the patients were afebrile, probably because they were in poor condition [presumably as a result of exposure and perhaps starvation resulting from the cyclone and the inundations], and in most of them vomiting quickly supervened; suppression of urine was observed.

The author discusses the diagnosis, and argues that the disease was probably a fulminating form of bacillary dysentery, rather than cholera. Anti-dysenteric serum seemed to have a distinct effect in curing the patients, the disease occurred in persons who had recently been vaccinated against cholera, and bacillary dysentery was endemic

in the area. [There is no record of bacteriological examination, but it is easy to understand that under such conditions laboratory work would be impossible unless special arrangements were made.]

Charles Wilcocks.

BOYD, J. S. K. & PORTNOY, B. **Bacteriophage Therapy in Bacillary Dysentery.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Feb., v. 37, No. 4, 243–62, 1 diagram. [25 refs.]

Conflicting reports on the value of specific bacteriophage in the prophylaxis and treatment of bacillary dysentery have appeared in the literature which is reviewed in this paper. It is noteworthy that those who found bacteriophage therapy beneficial usually had no adequate control series, while those who had instituted this check reported guardedly or unfavourably on the results obtained. The advocates of phage therapy in turn criticized the disappointing results by saying that the phage was too weak or non-specific, or not prepared against the local strains, or was given too late in the course of the infection.

Bacteriophage was apparently the standard treatment for forward troops of the German army in Africa. The preparation used was *Ruhr-bakteriophagen, polyvalent* prepared by Bayer, and large quantities were captured at El Alamein. This preparation was found to have a high potency against most of the dysentery strains prevalent in North Africa at that time. Boyd and Portnoy, therefore, decided to use it in a controlled experiment on German prisoners of war. Each P.O.W. camp consisted of a number of sections or " cages " which were more or less identical in size, feeding and sanitary arrangements, and medical care. Ill patients were admitted to the camp hospital from which, if the illness was serious or likely to continue for some time, the patient was transferred to a large P.O.W. hospital attached to the British hospital. Thus, while diarrhoeal conditions were all admitted to the camp hospital, cases of clinical dysentery were passed on to the special hospital. Two series of cages in a camp were chosen for the test. Bacteriophage was given orally to one group, in 15 cc. doses three times a day for two days, and 10 cc. three times a day on the third day. This treatment was begun on admission in every patient who reported sick with diarrhoea. Patients in the control group were given the standard saline treatment for dysentery. The two tables reproduced show that phage therapy had no effect in aborting the typical clinical infection, or in modifying it when established, although the average stay in hospital was rather less in the phage-treated group than in the control series. The authors remark that the stay in hospital was considerably greater than was found necessary among British troops nursed under British medical officers.

The percentage of isolations of the infecting organism was similar in the two series, 50 per cent. in the control and 55·5 per cent. in the treated group. [This is a small proportion of positive results; the culture medium used is not stated]. The presence of phage in the faeces did not seem to lessen the chance of isolating phage-sensitive dysentery strains. Experiments on the absorption and examination of bacteriophage showed that the lytic agent persisted in the faeces for 5–6 days after administration and was detectable for a short period in both blood and urine.

An experiment was planned to test the prophylactic value of bacteriophage. All the inmates of one cage were given 10 cc. of bacteriophage on a fasting stomach on three successive mornings. Observations on sickness rates relative to the total numbers at risk were kept for four weeks before and four weeks after the course of bacteriophage. The sickness rates in three similar cages served as control. The incidence among the control groups was 11·35 per 1,000 in the first four weeks, and 10·29 per 1,000 in the second four weeks. In the treated group, the corresponding figures were 27·58 and 19·5. Thus, there seemed to be a reduced incidence after the prophylactic course, but the difference was too small to be significant. The incidence in the treated group was higher than in the control series during the same period. [This is an important and well-documented paper which should be read by anyone interested in the treatment of bacillary dysentery.]

Incidence of Diarrhoea and Clinical Dysentery in the Control and Test Groups, from 10*th May*, 1943, *to* 9*th July*, 1943 (61 *days*).

	Control Group	Bacteriophage Treated Group
Daily average strength of group ...	4,590	4,070
Total number with symptoms of diarrhoea	283	347
Percentage of number at risk who developed symptoms of diarrhoea ...	6·16	8·52
Number of cases of clinical dysentery admitted to hospital	136	126
Percentage of number at risk who were admitted to hospital	2·96	3·1

Comparison of Control Cases and Bacteriophage Treated Cases. (*Clinical Dysentery*).

		Control Group	Bacteriophage Treated Group
Number of cases analysed		126	124
Assessment of severity on admission	Percentage mild ...	75·4	83·74
	moderate ...	18·25	12·90
	severe ...	6·35	3·36
Average number of days for blood and mucus to disappear		9·03	9·08
Average stay in hospital (days) ...		19·83	16·97

Robert Cruickshank.

POTH, E. J. **Use of Succinylsulfathiazole and Phthalylsulfathiazole as Intestinal Antiseptics.** *Texas State J. Med.* 1943, Nov., v. 39, 369. [Summary taken from *J. Amer. Med. Ass.* 1944, Jan. 15, v. 124, No. 3, 195.]

According to Poth, sulfanilylguanidine, which has been used successfully in the treatment of bacillary dysentery, has little antibacterial

activity when there are ulcerations in the bowel. This may explain the ineffectiveness of sulfanilylguanidine late in the disease. Succinylsulfathiazole alters the bacterial flora and reduces the bulk of the fecal material while rendering it semifluid. For this reason it can be used in the preoperative treatment of the gastrointestinal tract. Succinylsulfathiazole 0·25 gm. per kilogram of body weight, divided into six equal portions, is administered at four hour intervals by mouth. Postoperatively no gastric suction is used, and as soon as the patients can take 30 cc. of warm water, and this usually occurs within twenty-four hours after operation, the administration of the drug, similar to the preoperative regimen, is reinstituted. The drug is tolerated surprisingly well. Its administration is continued for from twelve to fourteen days postoperatively. In a series of some 50 patients in whom primary sutures of the large bowel was undertaken there has been no instance of peritonitis or fecal fistula. The studies on acetylated sulfonamides as intestinal antiseptics have been extended to new compounds, including phthalylsulfathiazole (sulfathalidine). This compound showed from two to four times the bacteriostatic activity of succinylsulfathiazole locally in the gastrointestinal tract, as indicated by the alteration of the coliform flora. Phthalylsulfathiazole, like succinylsulfathiazole, is sparingly absorbed from the gastrointestinal tract and should be more effective in treating bacillary dysentery than is succinylsulfathiazole or any other of the known sulfonamides.

BEIGLBÖCK, W. Zur Behandlung der Reiterschen Krankheit (Ruhrrheumatismus). [**The Treatment of Reiter's Disease.**] *Deut. med. Woch.* 1943, Nov. 26, v. 69, No. 47/48, 803–5.

In the war of 1914–1918, REITER described an atypical arthritis combined with splenomegaly, conjunctivitis, iritis, urethritis and cystitis, and since that time the symptom-complex has been known in Germany as "Reiter's disease."

Polyarthritis enterica, or dysenteric arthritis, is frequently complicated by ocular and urinary manifestations, especially in mild dysentery, but seldom in acute Shiga infections. The clinical picture of Reiter's disease is characteristic:—a febrile onset, with effusions, often of large size, into certain joints, especially the knee, and occasionally the mandibular and sternoclavicular.

The urethritis, which is complicated by cystitis and marked balanitis, causes relatively little inconvenience. Externally, some inflammation of the meatus can be observed. The urethritis and the conjunctivitis usually precede the polyarthritis in onset, and there are often iritis and iridocyclitis as well. The blood picture shows a marked polymorphonuclear leucocytosis, and the blood-sedimentation-rate is greatly increased. The aspirated synovial fluid is characterized by numerous polymorphonuclear leucocytes, a feature which is common also to the urethral and conjunctival discharges. Neither in smears nor in culture could any micro-organisms be detected. The joint fluid is light yellow in colour, somewhat opalescent and of a gummy consistency, with a high albumin content (2–4 per cent.). Notwithstanding claims to the contrary, no agglutination of dysentery emulsions by the synovial fluid was obtainable.

Some authors regard the syndrome as an allergic manifestation to dysenteric infection, as in most cases the serum agglutinates Flexner (rarely Shiga) organisms.

In contrast to acute and gonorrhoeal polyarthritis, heart complications have not been observed. The disease is intractable, often restricted to one or several large joints, and is singularly resistant to drug treatment.

Because of good results obtained in gonococcal arthritis, protein shock therapy with arthigon was tried. After three febrile reactions, the joint effusions diminished, there was no further extension and the conjunctivitis and urethritis cleared up. A typical case of successful treatment by this means is cited. It is probably best to begin with 0·1 or 0·2 cc. of arthigon and gradually increase to the effective dosage. The beneficial results of this form of treatment, and the eosinophilia which is sometimes present, support the hypothesis of the allergic nature of this symptom complex.

[Reiter's disease appears to be nothing else than the familiar dysenteric polyarthritis, with some superadded toxic manifestations which have been previously described. The splenomegaly remains unexplained.] *P. Manson-Bahr.*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

FRANK, J. R. **Amoebic Abscess of Spleen.** [Memoranda.] *Brit. Med. J.* 1944, Apr. 1, 458.

A record of a case in an Indian girl aged 12, who had been ill for a month. The spleen was greatly enlarged, but the liver was normal in size; there was leucocytosis of 13,400 (neutrophils 80 per cent.) and anaemia. A provisional diagnosis of amoebic splenitis was made, and emetine was given. Cysts of *Entamoeba histolytica* were found in the stools the following day, and within a few days a fluctuating swelling developed over the spleen. From this 40 cc. of sterile pus (similar to the pus of a liver abscess) were aspirated, and 10 cc. were withdrawn a few days later. No *E. histolytica* were found in the pus. The patient improved greatly in a short time.

Amoebic splenitis is rare, and is usually associated with hepatitis; in this case there was no clinical evidence of liver involvement.

Charles Wilcocks.

BØE, J. **The Occurrence of Human Intestinal Protozoa in Norway.** *Acta Med. Scandinavica.* 1943, v. 113, No. 4, 321–8. [24 refs.]

With a view to obtaining some idea of the incidence of intestinal protozoa in Norway the author has examined 1,111 patients in medical and surgical wards of three hospitals in Oslo. Of these patients 510 were females, 601 males, while 127 were children under 15 years of age. The majority of the patients, 740 in number, had no signs of gastro-intestinal disease, nor any other symptoms which might be attributed to intestinal protozoal infection. The incidence of such infections in these 740 patients is taken as an indication of the incidence in healthy persons in Norway. At least 50 per cent. are infected with one or more of the nine common intestinal amoebae or flagellates in the following percentages:—*E. histolytica*, 2·43; *E. coli*, 15·65; *E. nana*, 17·91; *I. bütschlii*, 7·97; *D. fragilis*, 7·70; *G. intestinalis*, 5·14; *C. mesnili*,

2·43; *T. hominis*, 1·08; *E. hominis*, 0·81. Clinical investigations could in no case establish any relationship between the symptoms and *E. histolytica*, which, however, was fully virulent to kittens. Certain of the carriers of *E. histolytica* gave a positive complement fixation reaction when their sera were tested by Craig's technique. *Gardia intestinalis* was more frequently encountered in those with gastro-intestinal disease than in healthy persons, and still more frequently in persons with symptoms attributable to gall bladder involvement, but it was not possible in any one case to conclude that the flagellate was the cause of the trouble. It was impossible to demonstrate any symptoms characteristic of this infection, and even less possible to draw any clinical picture of lambliasis. Nevertheless, the impression was gained that this flagellate was not entirely innocuous. *C. M. Wenyon.*

BEWS, D. C. & CHOQIETTE, L. P. E. **A Preliminary Study of the Incidence of the Intestinal Protozoa in the Canadian Armed Forces.** *Canadian Med. Ass. J.* 1943, Dec., v. 49, No. 6, 501–3.

Faecal specimens from 500 unselected patients, belonging to one or other of the armed forces of Canada, who were admitted to the Military Hospital at Ste. Anne de Bellevue, Quebec, were examined for protozoal cysts by the centrifugal floatation method. It was estimated that over 50 per cent. had some form of protozoal cyst. Though cysts of *E. histolytica* were not present, this high incidence of protozoal infections, in a country where sanitation is considered to be good, emphasizes the difficulties of prevention of dysenteric disorders and diseases of bad hygiene in the tropics, where it may be impossible to ensure or enforce the essentials of good sanitation. *C. M. Wenyon.*

LÜBINSKY, G. A. Lebensalterliche Verschiedenheiten der menschlichen Darmprotozoenfauna in Kiew. [**Age Differences of Human Intestinal Protozoan Fauna in Kiev.**] *Deut. Tropenmed. Ztschr.* 1943, Sept. 1, v. 47, No. 17/18, 457–64, 3 figs.

The paper records the results of the examination for intestinal protozoa of a single specimen from each of 1,000 inhabitants of Kiev varying in age from half a month to 82 years. Of these 70·2 per cent. harboured one or more of the protozoa. With the exception of *Giardia intestinalis*, which reached its highest rate in children 2–4 years of age (57–59 per cent. infected), there was a steady increase in infections with increasing age up to 73·9–89·6 per cent. in adults. *Entamoeba coli* was present in 34·1 per cent. of the 1,000, while 4-nuclear cysts (*E. histolytica*) were found in 17 per cent. *C. M. Wenyon.*

DREYFUSS, F. **Giardiasis.** *Harefuah.* Jerusalem. 1944, Feb. 1, v. 26, No. 3. [In Hebrew 45–7. (10 refs.) English summary 47.]

"After a few remarks on the epidemiology and morphology of giardia intestinalis, the parasites' localization in the organs of the patient and signs and symptoms in infected persons are discussed. A short account of our experience with this parasitic infestation is given. The frequency of hypochlorhydria or achylia in cases of giardiasis as observed in our cases has been stressed. Diagnosis is shortly explained. With reference to the pertaining literature the pathogenicity of the parasite is discussed. Giardia intestinalis is, in our opinion, conforming

with that of most recent authors, to be regarded as pathogenic for all practical purposes, at least when the infestation assumes certain proportions. In consequence, we advise in every case the removal of the parasite. Since Galli-Valerio's and Brumpt's discovery of the specific treatment of this condition by atabrin all the various methods previously used have become obsolete, being definitely less effective than atabrin. It has proved also in our hands as a most active parasitocide. Some details about this treatment are given. Several case histories illustrate the clinical features and treatment of the condition. It is emphasized that the finding of giardia in a given case should not induce the physician to overlook other pathologic conditions. Finally, the importance of a thorough parasitological examination is stressed especially but not only in abdominal diseases which may frequently disprove the presumptive diagnosis of a functional condition and so make it amenable to specific chemotherapeutic treatment."

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

CHORINE, V. & CROUGUE, O. Culture des spirochètes sanguicoles de l'homme. [**The Culture of Human Blood Spirochaetes.**] *Bull. Soc. Path. Exot.* 1943, Oct. 13, v. 36, No. 9–10, 262–74, 4 graphs on 2 pls. [45 refs.]

A general account of the various media which have been used for the culture of human relapsing fever spirochaetes, and the authors' experience in the growth of five strains, *viz. Spirochaeta hispanica, S. babylonensis, S. recurrentis, S. duttoni,* and *S. turicatae.*

Two media were used with the following composition :—

Medium No. 1.—Water containing 5 gm. of peptone and 7·5 gm. of NaCl per litre, adjusted to *p*H 7·5, filtered and sterilized in the autoclave	150 ml.
Unheated fresh rabbit serum	30 ,,
Medium No. 2.—Tyrode's Solution at *p*H 7·3—7·4	100 ml.
Unheated fresh rabbit serum	30 ,,
10 per cent. peptone water, not neutralized, sterilized at 120°C.	1·0 ,,

The media are placed in tubes 8 mm. in diameter and 18 cm. long. Sterility is tested by incubating the tubes for 24 hours at 37°C., the medium is then covered with a layer of paraffin 1 cm. thick, and the tubes again incubated for 24 hours. The media retain their properties for about one month if kept in the ice chest, but the authors advise the use of fresh media when isolating strains.

Before these culture media are inoculated with spirochaetes, it is necessary to add a small quantity of either defibrinated blood or laked blood. The latter has certain advantages since it can be passed through a Chamberland filter L2 or L3 before use, but unless a very fresh medium is used, human blood spirochaetes develop better in the presence of defibrinated whole blood.

During the isolation of culture strains the 2nd to the 8th passages are found to be the critical stages when fresh media should be used. The optimum temperature for growth is 28° to 30°C. The *p*H rises to 8·2 to 8·3 in the stored media, but the growth of spirochaetes produces an acidification, which is more rapid in Medium No. 1 than in No. 2.

The strains of spirochaetes tested grew better in Medium No. 1, with the exception of *S. turicatae* which required a more buffered medium, such as No. 2. *S. turicatae* has a marked acidifying action on the medium, whilst *S. hispanica*, *S. babylonensis* and *S. recurrentis* produce alkali. Spirochaetes are very susceptible to any fall in *p*H, hence the necessity for a buffered medium in the case of the former.

It is necessary to use blood containing numerous spirochaetes for the original inoculation and it takes 7 or 8 passages for the organisms to become adapted to the culture media. When the medium is favourable spirochaetes are always numerous and subcultures are successful. The virulence of the organisms is well maintained in cultures and falls off only very slowly. *E. Hindle.*

STEIN, G. J. **The Serological Diagnosis of Relapsing Fever.** *J. Exper. Med.* 1944, Jan. 1, v. 79, No. 1, 115–28. [21 refs.]

A description of methods on the differential diagnosis of relapsing fever based on the use of saponin-treated spirochaetes as antigens.

The author obtained suspensions of spirochaetes from the blood of rats or mice infected either with *Spirochaeta recurrentis* or *S. hermsi*. The heavily-infected blood was laked by means of saponin and then centrifuged at 2,500 r.p.m. for 45 minutes. The sediment was washed four times in physiological saline, using the same speed. The last suspension was then centrifuged at 1,300 r.p.m. for 30 seconds to remove any large particles, and the resulting fluid diluted until it showed a certain turbidity (MacFarland's No. 5 tube). This fluid contained at least 80 spirochaetes per oil immersion field and was used as the antigen in serological studies.

Various sera were examined for antibodies by agglutination and complement fixation tests. They included the sera of rats, mice and guinea-pigs infected with various strains of relapsing fever and also assorted heterologous and normal sera.

Spirochaetes obtained in this manner appear to have wide antigenic specificity and fixed complement in the presence of serum obtained from animals infected with six strains or species of relapsing fever, including *S. duttoni*, *S. kochii*, *S. novyi*, *S. recurrentis*, *S. hermsi* and *S. turicatae*.

Tests were also carried out with serum from three human cases of relapsing fever. One of these patients had been infected with *S. novyi* 36 years previously and gave slight positive reactions. The other two were infected therapeutically with *S. hermsi* and tested both before and after infection. The agglutination titre rose to 1–500 in one patient and 1–100 in the other and specific antibodies were present in both acute-phase and convalescent sera. Macroscopic agglutination of the spirochaetes was also observed with these sera.

Various other convalescent sera were tested, including those of typhus fever, malaria, Rocky Mountain spotted fever, Weil's disease, syphilis, and typhoid fever. These, and also hyperimmune serum prepared against other pathogens, failed to react with the relapsing fever antigens.

No apparent change in the antigens occurred after storage in the ice-box for at least four months, and the results indicate that spirochaetal suspensions, prepared in this way, yield a relatively stable antigen which will be of use in the serological diagnosis of relapsing fever.

E. Hindle.

GLÜCK, G. Besondere Verlaufsformen bei nordafrikanischem Rückfallfieber. [**Special Features of North African Relapsing Fever.**] *Deut. med. Woch.* 1943, Sept. 17, v. 69, No. 37/38, 653–5.

The author has seen two cases of North African relapsing fever with meningo-encephalitic symptoms and gives a detailed clinical history of the second case. This patient, a 26-year-old army officer, developed rheumatic symptoms, and a few days later showed slight jaundice and enlargement of the liver. A diagnosis of hepatitis was made, but 11 days after the beginning of the symptoms, the patient had a febrile attack which lasted three days and relapsing fever spirochaetes were found in the blood. An injection of neosalvarsan was followed by a negative period of 16 days and then a relapse, during which the patient developed marked symptoms of meningo-encephalitis, which lasted for about five weeks. Mice, inoculated with cerebrospinal fluid collected during this attack, showed spirochaetes in their blood. During the following month there were slight evening temperatures and various headaches. A second febrile attack developed 54 days after the first injection of neosalvarsan, and spirochaetes again appeared in the blood. The patient was cured by 3 further injections of neosalvarsan, each of 0·6 gm., at three-day intervals.

The author discusses the differences between the European and North African relapsing fevers, with special reference to the neurotropic properties of the latter, and for treatment recommends the use of at least four injections of neosalvarsan at three-day intervals.

E. Hindle.

PIFANO, F. Investigaciones para el estudio de la fiebre recurrente en Venezuela. [**Relapsing Fever in Venezuela.**] *Rev. Sanidad y Asistencia Social.* Caracas. 1941, Dec., v. 6, No. 6, 787–811, 4 figs. [14 refs.]

This is a detailed account of a well-devised and carefully performed investigation. It was planned in 1940 by the National Institute of Hygiene and envisaged work on epidemiological, clinical and parasitological aspects and on measures of control. Programmes of work in the field and in the laboratory were drawn up. The former included a study of the zones of prevalence of the disease, collection of arthropods, examination of possible reservoir hosts, of the blood of persons in contact with patients, to find out if healthy carriers existed; also the prevalence, age and sex of patients and possible sources of infection, and a clinical study of cases. The laboratory programme included a biological and bionomical study of *Ornithodorus venezuelensis*, determination of its food supply by precipitin tests, its infectivity for animals, cultivation of the spirochaete and so on.

It was found that all ages were attacked, but children more than adults; the reason for the disease being usually milder in adults is probably that a certain degree of immunity is acquired in childhood. Ticks in Venezuela are many: *Amblyomma*, *Haemaphysalis*, *Ornithodorus*, *Ixodes*, *Rhipicephalus* and *Boophilus*, but only *O. venezuelensis* transmits *Sp. venezuelensis*. It has a restricted range in the Andes, affecting in particular Mérida and Táchira. In Yayacuy occurs a species closely allied to *O. venezuelensis*. The habits of this tick resemble those of the bed-bug. It hides during the day in cracks in the wood of the bed or in the bed-clothes and emerges at night to feed. No reservoir

host was found; dogs, cats, pigs, pigeons, fowls, all were negative. Man seems to be the only host. An opposum, *Didelphys aurita*, harboured a spirochaete morphologically indistinguishable from *Sp. venezuelensis*, but its identity with *Sp. venezuelensis* was not confirmed biologically.

Clinically, the disease can be divided into three stages: The period of invasion (after an incubation of 7–15 days) with shivering, intense headache, backache and general pains in muscles and joints, fever 39–40°C., with nausea, vomiting and, at times, diarrhoea. The eyes are congested and skin dry. The second stage is characterized by jaundice and haemorrhages usually about the third day [but in another place the author states that bleeding is rare in Venezuelan relapsing fever; when it does occur it usually takes the form of epistaxis or bleeding from the gums]. The third stage is marked by renal symptoms, albuminuria, oliguria, or even anuria. In one case meningitic symptoms were observed: rigidity of the neck, Kernig's sign, bradycardia and delirium, and the cerebrospinal fluid was under increased pressure. Spirochaetes were found in the blood and the symptoms cleared up on specific treatment being instituted. The remission between attacks was from five to twelve days. Often the disease was cured, or attacks ceased after the first relapse; if others followed they were progressively milder and occurred at longer intervals. The disease generally is of a mild type and "up to the present no fatality has been recorded." [This was in 1941.]

Laboratory studies showed that the ticks had no spirochaetes in their salivary glands or intestine but, when present, they were in the coxal fluid or in the tarsal lymph, and it is thought that infection arises from these fluids by way of the wounds made by the bites or by scratching. Precipitin tests revealed no other food than human blood in these ticks, but rats and mice could be infected by subcutaneous injection or by ocular instillation of macerated infected ticks in saline. The incubation period was usually 4–6 days. After another 5–7 days the spirochaetes diminished and then could not be found at all until a relapse occured—just as in man. The brains of mice infected six months previously with *Sp. venezuelensis* were infective although their peripheral blood was not. The spirochaete was cultivable in Li Yuan Po's medium and in Moroder's horse-serum [see this *Bulletin*, 1930, v. 27, 113]. It grew well also in chicken embryo.

H. Harold Scott.

HOAGLAND, R. J., HARRIS, F. H. & CHINEN, S. S. **Leptospirosis (Weil's Disease).** *Hawaii Med. J.* 1943, Jan.–Feb., v. 2, No. 3, 131–6. [13 refs.]

A general account of the disease in which the authors stress the likelihood of it being encountered by medical officers in the military service, especially in the Territory of Hawaii.

It should be suspected when jaundice, fever, severe muscle pain and tenderness, conjunctivitis and haemorrhagic manifestations are present. Jaundice, however, is absent in 35 to 50 per cent. of the cases. Typically there is a leucocytosis of 10,000 to 30,000 cells per cmm. of blood with a relative increase of neutrophiles, accelerated red cell sedimentation rate, hyperazotaemia and hypercholaemia.

During the first week of illness, leptospirae may be isolated from the patient's blood by inoculation into culture media or into young guinea-pigs; during the third week of illness the organisms may be similarly

isolated from the urine. Agglutination tests give positive results after the first week of illness, with titres frequently over 1 : 10,000. Agglutination in dilutions of 1 : 300 is diagnostic if a rising titre is observed. The microscopic examination of urine sediment, stained by Fontana's method, is likely to show leptospirae during the third and fourth weeks of illness.

The clinical manifestations of leptospirosis, yellow fever and relapsing fever are similar, but the course of the fever is somewhat different in the first two diseases. The clinical distinction between leptospirosis and relapsing fever is also very difficult, but in the latter spirochaetes can usually be found in the blood during the febrile attacks.

Finally, the authors give details of a typical case of Weil's disease in an airplane mechanic, in Hawaii. Leptospirae were isolated from both the blood and urine of this patient. *E. Hindle.*

ALICATA, J. E. & BREAKS, Virginia. **A Survey of Leptospirosis in Honolulu.** *Hawaii Med. J.* 1943, Jan.–Feb., v. 2, No. 3, 137–42, 1 fig. [13 refs.]

Leptospirosis has been of medical interest in the Hawaiian Islands, especially since 1936 when the causative organism was first isolated from a human case, and the present survey was undertaken on behalf of the Public Health Committee of the Chamber of Commerce of Honolulu to determine the extent of the infection in man and animals.

During the six years from 1936 to 1942, 82 cases of the disease have been reported as follows :—Hawaii 59 ; Kanai 4 ; Lanai 14 ; Maui 1 ; and Oahu 4. Agglutination tests were carried out with the sera of 344 adult persons residing in Honolulu, using freshly formolized *Leptospira icterohaemorrhagiae* and *L. canicola* antigens. Of these, six sera agglutinated the former to a titre of 1 : 300 or more, and six to a titre of 1 : 100. One serum agglutinated *L. canicola* to a titre of 1 : 300.

Similar tests carried out with sera of 100 dogs gave 20 positive for *L. icterohaemorrhagiae* and 19 for *L. canicola*. The sera of 100 cats were uniformly negative.

The kidneys of 350 rats trapped in seven districts of Honolulu were examined microscopically by means of silver-stained sections, and 10 showed leptospirae. The kidney sections of 8 out of 97 rats trapped along the banks of three fresh-water streams were also positive. The rats belonged to four species, *Rattus norvegicus*, *R. rattus alexandrinus*, *R. rattus rattus*, and *R. hawaiiensis*, but the infection was found only in the first two species. The kidneys of 12 mongooses trapped along one of the streams were also examined and four found to be infected. This suggests that the mongoose may be of importance in the spread of the disease in nature. It probably becomes infected as a result of eating rats, animals on which it commonly preys.

A human strain of *L. icterohaemorrhagiae* was isolated by inoculating the urine of the patient into young guineapigs and then culturing pieces of infected kidney and liver of these animals in Verwoort's medium. A rodent strain was obtained by the same method, using kidney emulsions from infected rats. A strain of *L. canicola* was isolated from the kidneys of two infected dogs which had died from the disease.

Finally, the authors discuss methods of controlling the disease, the most important being rat control and the protection of human beings and dogs from exposure to infection. *E. Hindle.*

LEPROSY.

COCHRANE, R. G. **The Epidemiology, Pathology and Diagnosis of Child Leprosy (being the Dr. Elizabeth Mathai Endowment Lectures, 1942–43, delivered at the Medical College, University of Madras).** 24 pp., 1 chart. [40 refs.] 1943. Madras: Govt. Press.

This lecture includes an account of previously published work, much of which was dealt with in this *Bulletin*, 1944, v. 41, 47. In addition to the data in that paper illustrating the conditions under which the infection of children with leprosy most commonly arises, emphasis is laid on the frequency with which early and limited neural lesions undergo spontaneous recovery in children. The pathology of child leprosy is also dealt with and it is suggested that lepra bacilli, like the kindred tubercle bacilli, may remain latent for years after gaining access to children, and active symptoms and lesions only develop years after, when for some reason the conditions become favourable for the multiplication of the organisms in the tissues. The diagnosis is discussed on the usual lines and detailed descriptions are given of the early dermal lesions, which will be of service to those with little clinical experience, who should read the paper in full. *L. Rogers.*

FRAZIER, C. N. **Leprosy. Epidemiology and Natural History.** *J. Amer. Med. Ass.* 1943, Oct. 23, v. 123, No. 8, 466–8. [16 refs.]

This is a very general account of the epidemiology of leprosy. The author points out that on account of failures to cultivate the leprosy bacillus very little exact information is available on the mode of infection. He suggests that Stéfansky's rat leprosy bacillus may perhaps be identical with that of the human disease and infection derived from rats, although he quotes data to show a lack of relationship between rat distribution and the human disease. He agrees that long and close contact with human cases results in infections. His own experience of the disease was at Peiping, China, where during twenty years he saw only one case of leprosy which had definitely been contracted in that province, which is situated at approximately 40 degrees north latitude. Owing to the variable course of leprosy he was not convinced of the curative value of hydnocarpus preparations. *L. Rogers.*

FERNÁNDEZ VAUTREI, R. La lepra en Tovar (Estado Aragua). [**Leprosy in Tovar, Aragua State.**] *Rev. Sanidad y Asistencia Social.* Caracas. 1943, Aug., v. 8, No. 4, 681–710, 13 graphs.

This is a full account of a very detailed investigation in a very small locality. The municipality of Tovar was formed in 1942. Its area is about 35 sq. kilometres, with a population of 821 at the last census, distributed in 136 dwellings. Their degree of culture is low; few are able to read or write; their ideas of sanitation are deplorable. Though they clothe themselves in finery, they never bath; the houses are well constructed of wood and brick, but incommodious. Parents sleep in one room, the children in another, but often there is general promiscuity

(but prostitution and venereal disease are practically unknown). There is a resident doctor with a laboratory, a pharmacy and dispensary. Births number about 30 per annum. Whooping-cough is said to be a "main cause of infant deaths," but only nine deaths occurred in four years among children in the first year of life, and only six in the same period among those between one and ten years, from all causes. Over 90 per cent. of the children are infested with *Ascaris*. Leprosy is prevalent. Among the 821 inhabitants 32 lepers were found and 9 others were suspected, a rate of 39·6 per mille. Tables are drawn up to show the prevalence by ages, but with so small a total of inhabitants these confer no information of value, the numbers in any age period being so few; suffice it to say that the numbers of lepers increase from 20 to 40 years and then decline. Spread is fostered by promiscuity of living. The lepromatous and tuberculoid forms are about equal, 14 and 13 respectively; macular and anaesthetic are rare, 3 and 1 respectively [these total 31 only]. *H. Harold Scott.*

LOVING, W. L. **The Cultivation in Vitro of** *B. leprae* **with Thiamin (Vitamin B_1) Culture Medium.** *Amer. J. Trop. Med.* 1943, Nov., v. 23, No. 6, 593–6. [10 refs.]

The growth-promoting action of vitamin B_1 (thiamin) in culture media is well known, and attempts to cultivate *Mycobacterium leprae* on a thiamin medium are here recorded. "The medium consisted of alkaline nutrient agar as a base to which was added 1·0 per cent. aqueous solutions of cysteine, cholesterol and 0·1 per cent. tryptophan. Sterile unheated rabbit serum was also incorporated in the medium. To this pabulum after melting and cooling to 40°C. sterile vitamin B_1 (thiamin) was added as a contributing growth promoting substance. This stimulating factor was supplied in concentrations of 0·1 to 1·0 per cent."

A freshly excised human leprous nodule was crushed in a mortar with saline; 2 cc. of this emulsion was inoculated subcutaneously and intraperitoneally into each of six rabbits, and the inoculations were repeated after three weeks. Three of the rabbits also had small pieces of leprosy nodules implanted subcutaneously into the abdominal wall. One rabbit died three months after injection and implantation, and the other five were killed 1½, 2½, 3½, 5, and 5 months, respectively, after the last injection. Cultures from the lesions found in the organs of the rabbits were made on the special medium and incubated at 37·5°C.; concurrently, the juice of a human leprosy nodule was also inoculated on this medium. The cultures were sealed to prevent drying. Growth of a chromogenic acid-fast bacillus was obtained in the rabbit tissue cultures after 2½ months', and from the human leprosy cultures after 2 months', incubation. The bacilli were identical morphologically, culturally, and in staining reactions ['tinctorial'] with the acid-fast chromogenic leprosy culture of DUVAL [*J. Exper. Med.*, 1910, v. 12, 649; see also this *Bulletin*, 1913, v. 2, 504].

Anaerobic cultures from the affected organs of the rabbits and from human leprosy nodules remained sterile after incubation at 37·5°C. for over three months.

The author concludes that *Myco. leprae* can be cultivated *in vitro* under special nutritive conditions. He showed previously [this *Bulletin*, 1941, v. 38, 700] that a chronic infection could be established in rabbits. *L. Rogers.*

VEGAS, M. & ESPIN, J. Aspectos microscopicos de la lepra. I. Coloración del bacilo de Hansen. Proceder combinado de Baumgarten-Biot. [**Leprosy. I. Staining of** *Mycobacterium leprae.*] *Rev. Sanidad y Asistencia Social.* Caracas. 1943, Aug., v. 8, No. 4, 627–34, 3 figs. on 1 pl.

Demonstration of Hansen's bacillus in the tissues is easy in theory, but often difficult in practice. The bacilli are not all equally resistant to acid-alcohol; the young are thought not to have acquired this property, the old are too resistant. The method here detailed is based on that of Baumgarten. The tissue is fixed in formol rendered neutral by powdered chalk—10 cc. of commercial formalin to 90 cc. distilled water. The length of time they are in this is not important; tissues have stained well after being immersed for a year. If a decision is urgent, small fragments may be placed in boiling formol for 2–3 minutes or at 56°C. for 15 minutes. Sections by the freezing microtome are better than those in paraffin. The sections are then impregnated by placing them for 5–6 minutes in the following:—

Freshly prepared 5 per cent. carbonate of soda	30 cc.
Solution of silver nitrate, 10 per cent.	10 ,,
Ammonia added drop by drop till the precipitate is dissolved.	
Distilled water	110 ,,

This solution will keep indefinitely in a dark yellow non-actinic bottle, well stoppered. Without washing, the sections are transferred to a small vessel containing 20 cc. of 1 per cent. formalin in distilled water, gently agitating to obtain uniform reduction to a yellow colour. They are then treated with 1 : 500 chloride of gold till they became a uniform grey (1–2 minutes) and fixed for ½ minute in 5 per cent. hyposulphite of sodium, and thoroughly washed. Next they are stained in Ziehl's carbol fuchsin for 10–15 minutes at room temperature and rapidly washed. For differentiation the sections are transferred one by one into acid-alcohol (9 cc. of 96 per cent. alcohol and 1 cc. nitric acid, sp. gr. 1·4), gently moving to secure uniform decolorization. When they become pale in colour they are removed and quickly but thoroughly washed in water. Next follows a process which the author regards as particularly important, and calls *viro-fixation*, substituting, for methylene blue, formol to reinforce the staining of the acid-fast bacilli. BIOT used commercial formol, GALLEGO used 1 per cent., the authors prefer 10 per cent. as for fixing the tissues. It is left in contact for at least 5 minutes; longer does no harm. Then wash thoroughly, dehydrate, clear and mount. *H. Harold Scott.*

VEGAS, M. & ESPIN, J. Aspectos microscopicos de la lepra. II. Nota sobre una observación de "Globis" intraepiteliales. [**Leprosy. II. Intra-epithelial Globi.**] *Rev. Sanidad y Asistencia Social.* Caracas. 1943, Aug., v. 8, No. 4, 635–40, 2 figs. on 1 pl.

The authors state that, macrophages being absent from the epithelial layers and there being no blood to irrigate them, the presence of the bacilli of leprosy in these layers is due to tropism of these bacilli for the nerves. This, they maintain, is supported by the longitudinal direction of the organisms in the skin; the globi result from these bacilli lying free and proliferating in the interior of the epithelial cells. They present diagrams and photomicrographs in support of their views.

H. Harold Scott.

MOM, A. M. Relación entre la acción difusora de la piel lepromatosa y su contenido en bacilos de Hansen. (Comunicación preliminar.) [**Relation between the Reynals Factor and the Bacillary Content of the Leprous Skin.**] *Rev. Argentina de Dermatosifilologia.* 1943, Dec., v. 27, No. 4, 549–58, 2 figs. & 1 graph. [16 refs.] English summary.

The Reynals Factor [spreading factor ; diffusion factor] is the term given to the substance present in extracts of animal tissues, which increases the rate of diffusion in the skin of bacteria and vital stains ; it was first described by DURAN-REYNALS in 1928. This factor was applied in 1934 by THOMAS and DURAN-REYNALS to the area of reaction of tuberculized guineapigs to tuberculin, when they showed that the reaction area was more extensive but less in intensity than in controls. The Reynals factor is present in skin, but testicular extract is particularly rich in it.

Diffusion of extracts of normal skin was about one-half of that of testicular extract ; with extract of skin of tuberculoid leprosy it was slightly less than with normal skin ; with extract of skin from lepromatous leprosy diffusion was only equal to that of normal saline. This, it was supposed, was due to the greater numbers of bacilli in lepromatous skin, which apparently inhibited the spreading factor. The present work was to test the hypothesis that the inhibitory effect on diffusion was due to *Myco. leprae* and, as a corollary, that the diffusibility of extract of the lepromatous skin is inversely proportional to its richness in bacilli.

To test the former the author injected the depilated skin of the flanks of four rabbits with : (*a*) 0·2 cc. of whole lepromin *plus* 0·1 cc. of 1 per cent. trypan-blue ; (*b*) 0·2 cc. of bacillary lepromin *plus* the trypan-blue ; (*c*) As control, 0·2 cc. of physiological saline *plus* the trypan-blue. The whole lepromin was obtained by boiling and pounding lepromata rich in bacilli and titrating to 4 per mille in 0·5 per cent. phenol ; bacillary lepromin is a suspension of Hansen's bacilli prepared by the Fernandez technique [see this *Bulletin*, 1942, v. 39, 227]. The extent of diffusion was measured every half hour at first, then at 5, 10 and 24 hours. Even after 30 minutes it was clear that with whole lepromin the diffusion was much wider than with bacillary lepromin, in fact five times as great, while that of bacillary lepromin was no greater, and might be less than the saline control.

To test the second point, the relation of the diffusibility to the richness in leprosy bacilli, portions of skin were taken from a patient with few bacilli, from one with a moderate number, and from one with many, designated L_1, L_2, and L_3. These were triturated with 20 volumes of Ringer's solution, with sand, till homogeneous, the product was centrifuged at 4,000 r.p.m. and 0·2 cc. of each extract was injected, with 0·1 cc. of 1 per cent. trypan-blue, into the depilated skin of white rabbits and the diffusion of the stain noted as before. The results are shown in diagrams. The diffusibility of the lepromatous skin extract was found to vary inversely as the bacillary content. Hence, " comparing the diffusion of the antigen used for standard and bacillary lepromin intradermal reactions, the latter (pure suspension of bacilli) acts like a lepromatous skin rich in bacilli." The apparently paradoxical result that whole lepromin diffused well while the extract of skin containing many leprosy bacilli (L_3) diffused much less, is difficult to explain. It might be argued that the greater dilution and phenol content of the

former checked the inhibitory action of the leprosy bacilli on the diffusion factor; but the bacillary lepromin was equally dilute and contained phenol, yet its diffusion was slight. Possibly another condition intervened; the skin extract probably contained living bacilli while the bacilli in whole lepromin had been killed. Pending further experiments conclusions must be provisional. [For work by DURAN-REYNALS on spreading factor in snake venoms, see this *Bulletin*, 1939, v. 36, 563, 857.] *H. Harold Scott.*

FAGET, G. H. & MAYORAL, A. **Bone Changes in Leprosy: a Clinical and Roentgenologic Study of 505 Cases.** *Radiology.* 1944, Jan., v. 42, No. 1, 1–13, 20 figs.

This is an important and well-illustrated paper based on a large amount of material at the Carville Leprosarium, Louisiana, U.S.A.; it is based upon a study of 505 cases of all types.

TABLE 1—*Incidence of bone and muscle changes in leprosy.*

Types of Disease	Number of Cases	X-ray Bone Changes	Muscular Atrophy and Contracted Digits.
Mixed type	241	79	66
Lepromatous type ...	160	9	0
Neural type	92	59	26
Tuberculoid type ...	12	0	1
Total	505	147	93

The incidence of X-ray changes in the different types of the disease in relation to the presence of muscular atrophy and contracted digits is shown in Table I. The ages of the patients varied between four and 76 years; the majority were between 20 and 45. In neural leprosy there were bone changes in 64 per cent., in mixed leprosy in 33 per cent., and in lepromatous disease in only 5·6 per cent. More or less muscular atrophy and digital contraction were met with in 92 of the 333 mixed and neural cases; this amounted in some to typical claw hands and feet. The authors noted that although the majority of these had both neurotrophic and motor disabilities, many showed either bone absorption or muscular paralysis and contracture alone. They have not hitherto seen reports of this exclusive involvement of either the motor or the neurotrophic fibres in leprosy. Further, bone absorption is most marked when atrophy and contracture are inconsiderable, and the reverse is also true.

In neural leprosy the bone changes are not due to the direct action of Hansen's bacillus, but are secondary to neurotrophic lesions. Spontaneous absorption of bone thins out or shortens the phalanges, metatarsals and metacarpals; it generally starts in the distal phalanges and causes slicing and nicking of the tufts [tuberosities of the heads], then a shortening of collar-button type, followed by gradual disappearance. The bones seem to melt away, the proximal phalanges being the last to disappear; occasionally the metacarpals are also attacked. In the feet the absorptive process is more likely to start in the shafts of

the proximal phalanges or in the heads of the metatarsals. Rarefying osteitis produces a gradual thinning of the phalanges until only a fine needle of bone is left ; a process of " concentric bone atrophy," during which the medullary cavity disappears or becomes calcified. Complete disappearance of the bone may eventuate so that the toes are loosely connected to the foot by soft tissues. Trauma is a contributing factor, for ends of the fingers and the weight-bearing ball of the foot, where there is most pressure, are most affected. Subluxations result from affection of the small joints ; they are not entirely absent from larger ones, for the authors have met with five cases showing typical Charcot's joints of wrists and ankles. Long-standing leprous neuritis, resulting in disturbance of the nutritional functions of the affected nerves, is the main cause of bone absorption. It does not occur in purely cutaneous or lepromatous types. From their study of arteriograms the authors think that the arterial circulation of the extremities is not materially disturbed in neural leprosy ; in advanced and mixed cases, on the other hand, localized arterial defects and decrease in size of arterial branches were found, suggesting the leprous endarteritis [illustrated] described by FITE [this *Bulletin*, 1942, v. 39, 223]. Secondary bacterial infections play a part in the process.

The bone changes described in lepromatous cases are of special interest. Most cases are free from them, even in the most advanced stages. In the nine cases in which they were found they consisted in enlargement of the nutritive canals of the phalanges in four, cyst formation, which revealed the presence of lepra bacilli on being aspirated, in three, necrosis or osteomyelitis in one, and periostitis in one. The enlargement of the nutritive canals is believed to result from leprous endarteritis already mentioned. The bone cysts [illustrated by X-ray photographs] are attributed to the direct action of Hansen's bacillus in infecting the medullary cavity. *L. Rogers.*

COONEY, J. P. & CROSBY, E. H. **Absorptive Bone Changes in Leprosy.** *Radiology.* 1944, Jan., v. 42, No. 1, 14–19, 6 figs. [13 refs.]

This short paper reports the author's experience at the Palo Seco Leprosarium in the Panama Canal Zone ; it discusses the phenomenon of complete bone absorption of the small bones of the hands and feet of lepers, associated with loss of sensation and muscular power due to sensory and motor nerve lesions, together with neuro-circulatory changes leading to ulceration at the sites of pressure. The authors have seen cases with marked destruction of the metatarsal and tarsal bones, but with preservation of the phalanges intact. Very strong pulsation of the large arteries of the wrists and ankles indicated good circulation, associated with early enlargement of the nutritive foramina of the affected bones. A close study of fifteen cases has led them to attribute the observed bone absorption to the combined action of disturbance of circulation, anaesthesia and pressure. *L. Rogers.*

DHARMENDRA. **Immunological Skin Tests in Leprosy. Part IV. The Isolation of Three Different Protein Fractions from** *Mycobacterium leprae.* *Indian J. Med. Res.* 1943, Oct., v. 31, No. 2, 125–7.

In Part I of this series of papers the author recorded having isolated a protein antigen from *Myco. leprae* which alone was definitely antigenic [this *Bulletin*, 1942, v. 39, 228]. By further work on the extraction of

ground bacilli with weak acid, weak alkali, and 80 per cent. alcohol respectively, three different proteins were isolated. The antigenic activity of these fractions is considered in the present paper. It was hoped that one would be found specific for *Myco. leprae* and would give negative results in the vast majority of non-contacts, such as people living in Punjab villages without any leprosy cases. This hope has not been fulfilled, but the incidence of positive reactions on intradermal injection of the different protein fractions was 75 per cent. with nucleo-protein (extracted with alkali and phosphate buffer at *p*H 6·5), 60 per cent. with acid-soluble and only 30 per cent. with alcohol-soluble protein. The incidence of positive results in non-contacts has thus been markedly reduced and it is hoped that further work may yield a specific antigen. *L. Rogers.*

DHARMENDRA. **Immunological Skin Tests in Leprosy. Part V. A Bacillary Antigen Standardized by Weight.** *Indian J. Med. Res.* 1943, Oct., v. 31, No. 2, 129–32.

In view of the failure recorded in the foregoing paper to isolate a specific protein fraction of *Myco. leprae,* further studies have been made of more simply obtained standardized antigens from the whole bacilli, starting with partly de-fatted bacilli which produce both early and late reactions in neural leprosy cases. The bacilli are obtained by extracting leprous nodules with chloroform, storing for four days in a refrigerator, evaporating and suspending the residue in ether and centrifuging the ethereal suspension in a refrigerator. For standardization 1 mgm. of the powder is suspended in 10 cc. of 0·5 per cent. carbolic saline, and 0·1 cc. of this suspension is used for the test. It produces both early and late reactions, the early ones are the stronger in neural cases, but there were no reactions in lepromatous cases. This antigen is considered to retain most of the advantages of the protein fraction of the bacilli and to be easy to prepare. With the chloroform method the yield of bacilli is three times as great, and weight for weight it is more potent, than the one obtained by centrifuging a suspension in water of leprous tissue at different densities. *L. Rogers.*

WINDSOR-MCLEAN, L. A. **The Kline Reaction of Nauruan Lepers and Non-Lepers.** *Med. J. Australia.* 1943, Dec. 25, v. 2, No. 26, 520–22.

" The responses to the Kline test of 52 leprous Nauruans and 45 non-leprous Nauruans have been investigated.

" There is no statistically significant difference between the groups. Therefore, this investigation has produced no evidence that active leprosy tends to produce a positive reaction to the Kline test."

PARDO CASTELLO, V. & TIANT, F. R. La prueba de histamina. Con particular referencia al diagnóstico de la lepra. [**The Histamine Test in the Diagnosis of Leprosy.**] *Rev. Leprologia, Dermatologia y Sifilografia.* Marianao, Cuba. 1944, Jan., v. 1, No. 1, 19–23, 1 fig.

The so-called " triple reaction of Lewis " when histamine, 1/1,000, is injected intradermally comprises a purpuric spot at the site of inoculation with an erythema of several centimetres in diameter, in the centre of which a weal forms. It is said to be due to direct neurovascular stimulation, and a normal reaction implies integrity of the sensory

fibres of the peripheral nerves. The test is useful, therefore, in determining nerve degeneration after injury, in differentiating hysterical from organic anaesthesia, or feigned from true ; it is also an aid in localizing spinal lesions and in distinguishing nerve-root lesions from those of the spinal medulla.

The details of procedure in a suspected case of leprosy are as follows : A drop of 1/1,000 phosphate of histamine is placed on the suspect area, a second at the junction of this with normal skin, and a third on normal skin, and a puncture, not enough to draw blood, is made with a hypodermic needle through each. In the case of the normal skin, in 25–45 seconds an erythema arises from 3–5 cm. in diameter; in 68–100 seconds a weal, 2–5 mm. in diameter, appears in the centre of this erythematous area and in three minutes a haemorrhagic spot at the site of puncture. After 20 minutes or so (occasionally as long as 45 minutes) these signs fade. In a leprous part of the skin the weal appears but the erythema does not, so that, at the site of the second drop (see above) the erythema ends abruptly where the normal and affected parts meet. The authors prefer the puncture to the scarification method ; they think it gives more precise results.

With saline or distilled water there is a slight reddening with a minute weal which rapidly passes off. The authors have made the test on some 300 lepers in Havana and on 50 controls suffering from non-leprous skin conditions ; all the latter reacted normally. It is interesting to note that the reaction was normal also after local anaesthetization with procaine, and in a case of polyneuritis of ten years' duration with muscular atrophy, the reaction being, however, delayed ; also in a case of polyneuritis due to avitaminosis B_1, in another with tables dorsalis and a patient with generalized scleroderma. The authors have not yet had an opportunity of making the test on a patient with syringomyelia, but SCHUJMAN in 1939 did so and reported that the reaction was normal [see this *Bulletin*, 1940, v. 37, 337, where other references are given]. *H. Harold Scott.*

GAY PRIETO, J. Sobre la curabilidad de la lepra. Curación clinica y bacteriológica " espontanea " de un enfermo con lepra incipiente. [**The Curability of Leprosy. Spontaneous Cure of an Early Case.**] *Med. Colonial.* Madrid. 1944, Feb. 1, v. 3, No. 2, 71–7.

An interesting and unusual case. In May 1936, a young man of 22 years, living in Torreperojil, one of the chief foci of leprosy in the Province of Jaén [Spain], consulted the author. His father had died with numerous leprotic lesions two years before and this man had lived with his father until the latter's death. The man himself had macular patches on forearms, thighs and trunk, with slightly infiltrated edges and anaesthetic, so that portions could be taken for biopsy without his feeling any pain. There were no signs in the face and no acid-fast bacilli in the nasal secretion, but the biopsy specimens revealed abundant globi of Hansen's bacilli. He was classified as leprosy C1N1. He was ordered injections of Antileprol for six months and was told to return again then. In November 1943, that is 7½ years later, he returned, stating that owing to the Civil War and for other reasons he had had only 12 injections and these irregularly, and he wanted to know if he might marry. The place whence the fragment had been taken for biopsy and small patches the size of a 5-peseta piece were analgesic in two places on the forearm and the thigh ; sensation to touch was normal and

that to heat slightly altered—he could distinguish heat from cold only when the differences of temperature were considerable. No bacilli could be found in the nasal mucus nor in fresh biopsy specimens and the Rubino reaction, which had been positive at the first examination, was now quite negative. It would seem that the man had been cured, and that almost "spontaneously", for the amount of treatment he had received was negligible. He is, however, to present himself periodically for examination. *H. Harold Scott.*

DAVEY, T. F. & ROSS, C. **An Investigation of the Effects of Cocoyam on Leprosy.** *Leprosy Review.* 1944, Jan., v. 15, No. 1, 3–12.

The suggestion of the late OBERDÖRFFER that a diet rich in coco-yam (colocasia) may predispose to leprosy infection has already been shown by LOWE and CHATTERJI [this *Bulletin*, 1939, v. 36, 1015] to be contrary to the facts as regards India. This paper shows the same for Nigeria, in connexion with which country the hypothesis was first put forward. The present workers fed a group of leprous children in Nigeria with massive doses of coco-yam for a year, the cases being selected for low resistance to the disease and so most suitable for bringing out any toxic action of the yams. Yet no deleterious effects whatever could be observed. A study of the seasonal variations in the appearances of leprosy in relation to diet led to the conclusion that any slight toxic action of the sapotoxin in yams is not specific, and at the most is only one among many factors predisposing to infection with leprosy in Nigeria. *L. Rogers.*

IGNACIO CHALA, J. & LLERAS RESTREPO, F. Toxoide de la difteria en el tratamiento de la lepra. [**Diphtheria Toxoid in the Treatment of Leprosy.**] *Rev. Facul. de Med.* Bogotá. 1943, Sept., v. 12, No. 3, 125–45, 4 pls. [18 refs.] English summary.

"Twenty-four selected cases of leprosy in the service of the 'Instituto Federico Lleras Acosta' were treated with diphtheria toxoid. As a result of these treatments, the duration of which varied between four and twenty-six months, we were unable to obtain any clinical improvements or modifications in the bacterial fauna. We also gave diphtheria anatoxin to patients with positive 'lepra reactions,' but without any favorable therapeutical result.

"From these observations, we concluded that diphtheria toxoid had no value in the therapy of leprosy. On the other hand, we felt that its use might be dangerous in certain cases.

"Diphtheria anatoxin and toxoid mixed in various culture media, did not retard the normal growth of acid fast bacilli isolated from cases of leprosy."

GARCIA BARRIGA, H. Los vegetales en la terapeutica del "Mal de Hansen." [**Plant Products in the Treatment of Leprosy.**] *Rev. Facul. de Med.* Bogotá. 1943, Oct., v. 12, No. 4, 190–205.

MONEY, T. D. F. **Abstract of Administrative Reports on the Oji River Leper Settlement and Clinics for the Years 1941 and 1942.** *Leprosy Review.* 1944, Jan., v. 15, No. 1, 15–18.

Reports for 1941 and 1942 on the Oji River Leper Settlement, Nigeria, show a great development of the work during the last five

years. The object of the settlement is to provide treatment to as many patients as possible, and about three-fifths of the worst affected areas of the Onitsha province are now within reach of the clinics that have been established around the headquarter leper colony. An African staff has been trained to assist in carrying out treatment, laboratory work, keeping records and in nursing the serious cases, and much educative work has been done to enlist the support of public opinion. The records of patients now number over 14,000. Oral treatment with hydnocarpus oil is continued in patients whose disease has ceased to be active as the result of parenteral treatment, on account of the large number to be dealt with. The great majority of the patients in the Settlement support themselves on their own farms and contribute a portion of their time in unpaid work in the settlement; this greatly reduces the expenses, which amount to only £2,444 a year, contributed by the Native administration, B.E.L.R.A. and the Church Missionary Society. Statistics of the work done are given, but no clinical details or results of treatment are included. *L. Rogers.*

DHARMENDRA & BOSE, R. **Bactericidal Action *in vitro* of Sulphanilamide and Sulphapyridine on *Mycobacterium leprae muris*.** *Indian J. Med. Res.* 1943, Oct., v. 31, No. 2, 133–6.

The action *in vitro* of sulphapyridine and of sulphanilamide on suspensions of Stéfansky's bacillus in leprous lesions of rats during 48 hours at a temperature of 37°C., and for 96 hours at 4°C., has been tested by injecting the material so treated into rats. Control experiments with similar treated suspension without the addition of the drugs produced generalized rat leprosy in those which survived for four months or more, but the addition of 1–1,000 of either drug at 37°C., and of sulphapyridine in a dilution of 1–10,000 prohibited the development of the disease. The results with sulphanilamide in a dilution of 1–10,000 at 37°C. were inconclusive owing to early death of the injected animals; the suspensions were not free from microorganisms other than that of rat leprosy. On the other hand, in suspensions kept at 4°C. the drugs failed to prohibit the infective action of the rat leprosy organisms. Five per cent. sulphuric acid, subsequently neutralized with caustic soda before injection, also failed to kill rat leprosy bacilli. *L. Rogers.*

PRUDHOMME, R. O. Acide ascorbique et lèpre murine. [**Ascorbic Acid and Rat Leprosy.**] *Ann. Inst. Pasteur.* 1943, July–Aug., v. 69, Nos. 7–8, 215–18.

This note records an experiment in which 10 rats were infected with rat leprosy. Five of them were given, a month afterwards, injections of 0·03 gm. of ascorbic acid every three days over a period of 45 days, repeated two months later up to a total of 32 injections. The experiment was based on previous analyses of the number of milligrammes of ascorbic acid found in the organs and lepromata of leprosy-infected rats; next to the suprarenals the largest amount was in the lepromatous tissues. Autopsies on the infected rats at different intervals showed that after four to five months the local lepromata at the sites of infection were considerably larger in the five rats which had received the injections of ascorbic acid than in the control animals. This they attribute to increased cellular reaction at the sites of infection in those animals

receiving the injections of vitamin C. On the other hand, little difference was found in the generalization of the infection, or in the number of rat leprosy bacilli in the internal organs in treated and in the control rats respectively. *L. Rogers.*

HELMINTHIASIS.

PIFANO C., F. & MAYER, M. Sobre el comportamiento de la reacción de Fairley en los estadios clinicos de la Schistosomiasis mansoni. [**On the Behaviour of the Fairley Reaction in the Clinical Stages of Schistosomiasis mansoni.**] *Rev. Sanidad y Asistencia Social.* Caracas. 1942, June, v. 7, No. 3, 379–96, 2 charts.

In a previous paper [*Rev. de San. y Asist. Soc.*, 1941, v. 6, 290–295] the authors gave an account of their first series of experiments on this question and their methods of making the antigen used. They also there gave a summary of earlier work, some of which is also here summarized. The antigens used in the work here described were the same as those used for the first experiments, namely, alcoholic extracts of the hepatopancreas of *Planorbis* (*Australorbis*) *glabratus* [see BRUMPT, this *Bulletin*, 1942, v. 39, 866 for the correct name of this species], which had been naturally infested with *Schistosoma mansoni*. They also used alcoholic extracts of the hepatopancreas of the same snail infested with other species of cercariae and with normal hepatopancreas. A later paper will deal with a comparative study of these antigens. Special attention was given to the use as antigens of cercariae not of the genus *Schistosoma*, which are found in the snail intermediate hosts of *Schistosoma* in Venezuela; the results of this work will be published later.

Two techniques were employed. The first was a complement fixation reaction, similar to Fairley's, with heated inactivated serum. The second technique was a reaction with fresh sera done by Rubinstein's variation of the method of Hecht. Both methods are described in detail.

Describing the extensive work of FAIRLEY, MACKIE and JASUDUSAN [this *Bulletin*, 1931, v. 28, 196] on infestations of goats with *S. spindale*, the authors point out that very little has been done with the Fairley reaction in the different stages of human infestations with *S. mansoni*. They have studied it during the period of invasion, the period when the disease is established and the terminal period of cirrhosis. Controls were done with patients suspected of bilharziasis, with healthy persons and with patients suffering from other diseases. The reaction in the period of invasion could be studied in only three cases, details of which are given. In all three cases the entry of cercariae from infested waters could be proved and the eggs were found in the faeces. Symptoms of the toxaemic type predominated, as happens when the cercarial infestation is massive. It was found that the antibodies appear at the beginning of the third week after contact with infested water; the more intense the infestation the earlier they appeared. In the period when the disease was established antibodies were found in 97·3 per cent. of cases which were proved parasitologically to be infestations with *S. mansoni*. In cases clinically suspected of schistosomiasis, with a history of possible latent schistosomiasis (bathing in infested

waters) but without eggs in the faeces, specific antibodies were obtained in 40 per cent. The authors think that very possibly there exist in such cases unisexual infestations or infestations with a preponderance of male worms [see MAYER & PIFANO, below].

In cases of advanced bilharzial cirrhosis with hepatic atrophy, ascites and splenomegaly of various degrees, the presence of antibodies was always shown by the intensely positive reactions, although in some of them there were extremely few eggs in the faeces. The Fairley reaction has thus a practical value for the diagnosis of infestations with *S. mansoni* in the sense that a positive reaction allows the conclusion that a trematode infestation exists and especially an infestation with *Schistosoma*. But the fact that the authors encountered 2 per cent. of cases which were certainly infested with *S. mansoni*, as parasitological examination proved, yet showed negative reactions, means that a negative reaction does not definitely exclude diagnosis of schistosomiasis in suspected cases. For this reason the authors are trying to perfect the reaction and to complement it with other biological methods. *G. Lapage.*

LUTTERMOSER, G. W. & PIFANO C., F. Aspectos epidemiologicos de la Schistosomiasis mansoni en San Casimiro (Estado Aragua). [**Epidemiological Aspects of Infestation with** *Schistosoma mansoni* **in San Casimiro (Aragua State).**] *Rev. Sanidad y Asistencia Social.* Caracas. 1942, June, v. 7, No. 3, 397–418, 9 figs. [14 refs.]

The authors carried out an epidemiological study of schistosomiasis in San Casimiro, Aragua State, in the second fortnight of July 1941. San Casimiro, the capital of the district of the same name in the north-east of Venezuela, is bordered to the south and west by two of the three rivers which form the natural water system of this region. The irrigation system is very limited and there are few canals near the town; but the rivers are used by the people and in them the snail vectors of the disease are abundant. A map gives details of the water system and habitats of the snails (*Planorbis* (*Australorbis*) *glabratus*). A table gives the geographical distribution of the snails and the results of examination of them for cercariae. The local characteristics are described in detail. Human infestation was measured by egg counts done by the Stoll dilution method and, when this failed to reveal eggs, as it often did, sedimentation methods were used. Measurement of the size of the liver by the hepatometric system of GABALDÓN [*Gaceta Méd. de Caracas*, 1933, v. 40, 219] which is similar to the method of measuring the spleen described by KANDELAKI [this *Bulletin*, 1932, v. 29, 361] showed a correlation between the hepatometric index and the number of lateral-spined eggs in the faeces (parasitic index).

The liver is the organ most attacked in schistosomiasis, either mechanically or by toxins produced by the worms or by the eggs, and JAFFÉ has therefore proposed to call infestations with *S. mansoni* not intestinal, but hepato-intestinal, schistosomiasis. In San Casimiro the authors observed: (*a*) cases of bilharzial hepatitis, either subfebrile or apyrexial, in which hepatomegaly was the only external symptom; 90 per cent. of such cases had a history of "dysentery" and most of them had some degree of splenomegaly; (*b*) cases of hepatic hypertrophy with symptoms of cirrhosis accompanied by splenomegaly; this was the most frequent form of cirrhosis seen and it was found in all the young persons. Of the three categories of cases established by

the authors, the largest group were those with hepatomegaly and eggs in the faeces, the smallest those with hepatomegaly without eggs in the faeces; the third group had no hepatomegaly, these infestations being possibly benign or too recent to have caused enlargement of the liver.

Examination of the faeces showed that 78 per cent. of the population were infested. This high incidence is explained by the fact that optimum conditions exist for the development of the snails and for the infestation of man and these are maintained in the endemic area. Procedures are recommended for a campaign against the disease. These include the destruction of the snails with lime where the soil is acid or with carbonate or sulphate of copper where it is alkaline, the encouragement of the breeding of ducks, cleansing of the waterways, removal of vegetation and other measures designed to discourage the breeding of the snails. Education of the population about the disease and its mode of transmission, supervision of the area, encouragement of agriculture and industry in order to raise the economic level and the nutrition of the people, and the establishment of a dispensary for treatment are other measures recommended. *G. Lapage.*

MAYER, M. & PIFANO C., F. Estudios biologicos y patologicos en animales infectados con *Schistosoma mansoni* (infecciones bi-y unisexuales). [**Biological and Pathological Studies in Animals infested with** *Schistosoma mansoni* (**Bi- and Unisexual Infestations**).] *Rev. Sanidad y Asistencia Social.* Caracas. 1942, June, v. 7, No. 3, 419–28. [17 refs.]

The authors worked especially with mice infested by putting them for half an hour in a container filled to a depth of 5 cm. with water infested with numerous cercariae of *S. mansoni* which had emerged the same morning from the snails. Autopsies on the mice at intervals showed that the worms need about 40 days to attain maturity. Earlier than this they rarely found worms *in copula* or eggs in the liver or mesenteric veins. The simplest proof of maturity of the worms would be the presence of eggs in the faeces, but the authors were "habitually unsuccessful" in finding these, because the passage of eggs in the faeces by mice infested by the Venezuelan strain of *S. mansoni* is very rare. It is known that rabbits and rats infested with *S. mansoni* usually do not pass eggs in the faeces. OSTERLIN [this *Bulletin*, 1935, v. 32, 250] however, found eggs in the faeces of mice infested with a West African strain of *S. mansoni* with great regularity, possibly because that strain was of greater virulence.

The authors found eggs in the faeces of 14 of their mice 50 days to 3 months after their infestation; but other mice with larger infestations showed no eggs in the faeces. In 16 mice adult worms were found in the mesenteric veins three months after infestation; in three mice they were present 3–4 months after infestation and in 34 examined from 1 to 18 months after infestation, there were none in the mesenteric veins. The authors concluded that the worms are most likely to pass large numbers of eggs at a stage of the disease corresponding to a short time after their maturity is attained. They have data of a number of human patients at this stage who had a dysenteric syndrome and abundant eggs of *S. mansoni* in the faeces four to five weeks after their first infestation.

Tissue reactions against eggs deposited in the intestinal wall can very quickly impede the passage of the eggs into the gut cavity and this explains the absence of eggs from the faeces of many patients in the advanced stage of the disease. The number of eggs passed in the faeces is also influenced by the degree of the infestation and by the proportion of the sexes of the worms present. Whenever their mice showed eggs in the faeces most of those that did had been infested with the same suspension of cercariae; they never found that a single mouse of a given group showed eggs in the faeces while the others of that group did not. Autopsy on mice which were passing eggs in the faeces showed an approximate equality of the numbers of male and female worms present. Autopsy of mice which were not passing eggs in the faeces showed a preponderance of one sex; in one such group, for example, one mouse had 22 male worms and only one female, another had 20 males and only one female, and both had few eggs in the liver. The authors suggest that similar human infestations with a preponderance of one sex may occur and that, when they do, there might be no eggs in the faeces and all the symptoms would be produced either mechanically or by toxins produced by the worms. Such infestations can occur by chance. Since each snail may liberate daily some 2–3,000 [*sic*] cercariae of *S. mansoni* (all of one sex) and about 200,000 during its life of some months (HOFFMANN) unisexual infestations can occur by chance fairly often, especially if the infestation is acquired by only one bathe in infested water.

A further cause of the absence of eggs from the faeces in chronic human cases may be the greater longevity of the male worms. One of their mice, killed five months after infestation, had only male worms and nodules and calcified eggs in the liver; no female was found. Other mice of this same group which died two to three months after infestation had many male and female worms.

The authors think, however, that infestation by a single sex is the most important cause of the absence of eggs from the faeces. They summarize the experimental work which indicates that each snail liberates only cercariae of one sex, sexual differentiation beginning in *Schistosoma*, as CORT (*Amer. J. Hyg.*, 1921, v. 1, 1) suggested, in the fertilized egg. They refer to FAUST's (*J. Parasitology*, 1927, v. 14, 62) conclusion that in the dry season only male cercariae exist in those snails which survive. The experiments on the infestation of animals with cercariae from only one snail were still in progress at the time of writing, but they had by then found in most of their unisexual infestations of mice, a very variable necrosis of the hepatic cells, which depended, not on the number of the worms, but on their position in the portal vessels. The cells of Kupffer were, however, always well preserved. This degeneration occurs in both male and female unisexual infestations and they think it is due to immature worms. It may form the basis of a later cirrhosis with its clinical consequences.

G. Lapage.

LUTTERMOSER, G. W. Destrucción de caracoles transmisores de *Schistosoma mansoni* en Venezuela. [**Destruction of Snails which transmit** *Schistosoma mansoni* **in Venezuela.**] *Rev. Sanidad y Asistencia Social.* Caracas. 1941, Dec., v. 6, No. 6, 874–97, 10 figs. [19 refs.]

The main conclusions of this paper have already been briefly summarized in the abstract of Part II of the author's account of this work

[this *Bulletin*, 1943, v. 40, 849]. Giving a brief review of the literature, the author says that, in Venezuela, 20 per cent. of the 2,000 autopsies done in the Vargas hospital during the last four years have revealed an infestation with *Schistosoma mansoni*. There is risk of infestation around Caracas and infested snails are frequently found in the irrigation system of Venezuela. The author's laboratory and field methods are then described, together with the results on which the author bases recommendations for a campaign against the disease, which are similar to those summarized in our previous abstract. The snails, miracidia and cercariae can be killed by lime, which, in the quantities recommended, is not toxic to domestic animals and does not harm the cultivated land, which, in Caracas and its neighbourhood, is generally acid. The antibacterial action of the lime also purifies the water, with a consequent reduction of other water-borne diseases. *G. Lapage.*

SANABRIA, A. El electrocardiograma en la miocarditis bilharziana. [**The Electrocardiogram in Bilharzial Myocarditis.**] *Rev. Policlinica Caracas.* 1943, July–Aug., v. 12, No. 71, 203–12, 5 figs. [11 refs.]

The following is a translation of the summary and conclusions :—

(1) We studied 15 cases of bilharzial myocarditis with the electrocardiograph : the P wave was modified in one ; in another the P–R interval was prolonged ; bundle branch block occurred in three cases ; low voltage in 3 ; notching of QRS in 2 ; modification of the T wave in 4 ; and in 1 case the Q–T interval was prolonged.

(2) There is no typical electrocardiographic sign in bilharzial myocarditis comparable with what is shown by autopsy ; nor is it possible to distinguish the signs from those of syphilitic cardiac disease.

(3) The results obtained are discussed. *J. F. Corson.*

VON BONSDORFF, B. **The Inhibitory Effect of** *Diphyllobothrium latum* **on the Proteolytic Activity in Vitro of Depepsinized Human Gastric Juice.** *Diphyllobothrium latum* **and Pernicious Anemia III.** *Acta Med. Scandinavica.* 1940, v. 105, No. 5–6, 502–15, 11 figs.

" The gastric protease which is active at a pH range from 5 to 9 and above—and which is supposed to be identical with the so-called ' intrinsic factor '—is greatly inhibited in its hydrolytic capacity in vitro after the addition of even relatively small amounts of a suspension of fresh Diphyllobothrium latum. The inhibitory effect is well preserved in dried worm, but it gradually becomes weaker in dried worm which is stored more than 3–4 months. The inhibiting substance is destroyed by heating to 80°C. for 20 minutes. It is not dialyzable and is not soluble in ether, nor yet in 96 per cent. ethyl alcohol. It cannot be precipitated with 50 per cent. alcohol, but can be precipitated quantitatively in 90 per cent. alcohol. The inhibitory effect is equally great independent of the pH at which the aqueous extracts are prepared (proved for pH 1·7 to 9·0), and it is obviously not conditioned by any product arising during the autolysis of the worm ; in other words, the inhibitory substance is to be found preformed in the worm." [See also this *Bulletin*, 1940, v. 37, 215, 216.]

VON BONSDORFF, B. **On the Reticulocyte Response and Course of Remission after Removal of the Worm in Patients with** *Diphyllobothrium latum* **and Pernicious Anemia.** *Diphyllobothrium latum* **and Pernicious Anemia IV.** *Acta Med. Scandinavica.* 1940, v. 105, No. 5–6, 516–39, 13 figs.

"In Diphyllobothrium latum carriers with pernicious anemia the expulsion of the worm is usually followed by a definite reticulocyte response and blood regeneration. In these cases the anemia can be regarded as caused by the parasite. In certain cases the worm infestation only represents an incidental association with the anemia; the administration of the anthelmintic is not followed by remission. In some cases of cryptogenetic pernicious anemia it seems that the presence of Diphyllobothrium latum makes the disease picture worse.

"The reticulocyte response in cases of pernicious tapeworm anemia after the worm has been expelled does not reach quite such high values, but instead lasts considerably longer than after injections of a potent liver preparation. In both cases the remission proceeds at the same rate (about 100,000 red blood corpuscles/1 mm^3 per day).

"Already, 48 hours after the expulsion of the worm, a change of the megaloblastic proliferation in a normoblastic regeneration type could be proved in the sternal marrow.

"It has not been possible to confirm any obvious correlation between the amount of gastric juice and the occurrence of free hydrochloric acid on the one hand and the intensity of the regeneration after the removal of the worm on the other."

VON BONSDORFF, B. **On the Proteolytic Activity in Vitro at Neutral Reaction of Gastric Juice from Patients with Cryptogenetic Pernicious Anemia and with Pernicious Anemia due to** *Diphyllobothrium latum. Diphyllobothrium latum* **and Pernicious Anemia V.** *Acta Med. Scandinavica.* 1940, v. 105, No. 5–6, 540–57. [Numerous refs.]

"The proteolytic gastric enzyme active at neutral reaction—like the intrinsic factor—is present in cases of pernicious anemia in Diphyllobothrium latum carriers where the blood disease is proved to be due to the infestation with the worm, as well as in cases where this connection is more or less uncertain for different reasons. This enzyme also occurs regularly in cryptogenetic pernicious anemia."

HIRVONEN, M. Serumeisenuntersuchungen an *Bothriocephalus latus*- und *Taenia saginata*-Patienten. [**Studies on the Serum-Iron of Patients infested with** *Diphyllobothrium latum* **or** *Taenia saginata.*] *Acta Med. Scandinavica.* 1941, v. 108, No. 1–2, 63–72, 2 figs.

Hitherto the serum iron in patients infested with *Diphyllobothrium latum* and *Taenia saginata* has not been studied. In earlier work the author found that the serum-iron varied from the normal in some patients with intestinal worms. In both his earlier work on serum iron (*Duodecim*, 1940, v. 56, 533; *Acta. Med. Scandinavica*, 1941, v. 106, 495) and in the present work, the author used the method of HEILMEYER and PLÖTNER ("Das Serum eisen und die Eisenmangelkrankheit," Jena, 1937) to determine the serum iron.

The author studied 77 patients ; the serum iron values of all of them were determined before treatment of the worm infestation and the values of 36 of them were taken once or more after treatment. A table gives the values before treatment, the sex of the patients, the haemoglobin percentage, the number of red blood cells and the diagnosis (19 came to hospital for treatment of the worm infestation only and 58 had other diseases as well). As the lower limit of the normal values the author took 80 gamma per cent. for males and 60 gamma per cent. for females. The threshold between the normal and increased serum iron values is not so sharply defined. Discussing this, the author refers to the work of HEILMEYER and PLÖTNER (*op. cit.*) and WALDENSTRÖM, (*Nordisk Med.*, 1940, v. 8, 1703) and selects as the threshold between normal and increased serum iron values the figures 180 gamma per cent. for males and 170 gamma per cent. for females. *Diphyllobothrium* was found in 74 cases and *Taenia saginata* in 3. In 43 the serum-iron was normal, in 18 (6 men and 12 women) it was increased, in 16 (6 men and 10 women) it was below normal.

Among patients with normal values 11 had worm infestations only, 32 had other diseases as well. Of the patients with values below normal all had *Diphyllobothrium latum* and all had other diseases as well. In three of these cases the worm played no part in the decrease of the serum iron. Of patients with increased values 4, all of them women, had severe anaemia; one had orthochromic and three had hyperchromic pernicious anaemia, stated to be due to the presence of the worm. The remaining 14 (6 men and 8 women) had no anaemia ; 8 of these had worm infestations only and 6 had other disease as well ; in this group, two women had *T. saginata* and six men had *Diphyllobothrium.* The author thinks that the worms were partly responsible for the increased values in two women in this group infested with *Diphyllobothrium.*

The effect of treatment of the worm infestations was studied in 16 patients in whom the serum iron values were normal before treatment. After treatment these values varied, but within normal limits and irregularly. In 16 cases with increased serum iron before treatment, the values decreased after treatment in all but two cases within the first 24 hours and were, after four days, practically normal in all. In the two exceptions the values remained above normal but these two cases could not be followed up longer than two days because of the discharge of the patients. It was hardly to be expected that treatment of the worm infestations would affect the serum iron in cases in which this was decreased, because this decrease was apparently not due to the worm. In four such cases studied, all of whom had anaemia, worm treatment appeared to have no effect on the serum iron. In two of these cases it remained below normal and in two it was increased.

G. Lapage.

MUKERJI, A. K. & BHADURI, N. V. **Increasing Incidence of *Taenia solium* Infection in Calcutta.** *Indian Med. Gaz.* 1944, Jan., v. 79, No. 1, 19–20.

During the years 1928–1942 only three cases of infection with *Taenia solium* were observed by the authors among 20,664 persons examined ; during the same period there were 281 cases of infection with *T. saginata.* In 1943, up to the middle of August, they saw six cases of infection with *T. solium* (and 22 of *T. saginata*) among 887 persons examined. This increase is attributed to an increased demand

for pork, arising from the present abnormal increase in the city's population. Those affected were: an English Government official (pork and sausages); a European nun (pork and sausages); a coolie (pork); and three Anglo-Indian children (sausages). *J. F. Corson.*

JONES, Myrna F. & HOLLAENDER, A. **Effect of Long Ultra-violet and Near Visible Radiation on the Eggs of the Nematodes** *Enterobius vermicularis* **and** *Ascaris lumbricoides*. *J. Parasitology*. 1944, Feb., v. 30, No. 1, 26–33, 6 figs.

In a previous paper [this *Bulletin*, 1941, v. 38, 526] the authors found that the greatest sensitivity of the eggs of *Enterobius vermicularis* was at wave lengths below 2,400Å. They now report the effects on the eggs of this species and of *Ascaris lumbricoides* of radiation in the 3,500Å and 4,900Å range, exclusive of short ultra-violet and infra-red radiation. The mercury-vapour lamp and methods employed are described and a brief summary of the literature is given.

Lethal effects on the eggs of both species were observed after radiation with sufficient energy. The effects were most pronounced at 35–38°C. and were less rapid at 23–28°C.; below 20°C. (*i.e.* at 8–15°C.) many eggs survived the exposures given (up to 199×10^7 eggs per cm.^{2}). There were no marked differences in the resistance of eggs in water or when they were dry, but the differences noted suggested that dry eggs were rather less resistant. The energy necessary to produce a damaging effect with radiation in this 3,500Å to 4,900Å range is very great if it is compared with the ultraviolet radiation at wave lengths shorter than 3,000Å. The energy necessary for lethal action on eggs of *E. vermicularis* at wave lengths above 3,500Å is approximately 1,000 times that necessary at wave lengths below 3,000Å. "The region of the spectrum which was produced experimentally is quite intense in sunlight, although the distribution of wave lengths within the range is not the same." Sunlight might be expected to be more damaging than the mercury radiation used in these experiments and may be expected to be lethal if it is given enough time to act, especially if it is correlated with high temperature and low humidity. The authors compare the delayed development of some of the *Ascaris* eggs with their delayed development under conditions of low oxygen consumption and suggest that the radiation may affect the respiratory system of the eggs. *G. Lapage.*

TRIM, A. R. **Experiments on the Mode of Action of Hexyl Resorcinol as an Anthelmintic.** *Parasitology*. 1944, Mar., v. 35, No. 4, 209–19, 9 figs. [10 refs.]

With the object of getting further information about the action of anthelmintics the author studied the mode of action of hexylresorcinol, because this drug has been studied pharmacologically and has been shown to be the most active of a large number of phenolic substances against *Ascaris* and hookworms (LAMSON *et al.*, *J. Pharmacology*, 1935, v. 53, 198, 218, 227, 234 and 239) [see also this *Bulletin*, 1936, v. 33, 577]. Trim used the coupling reaction of phenols with diazonium compounds to form azo dyes and found that it could be used as the basis of a quantitative method. He based his procedure on the method

used by DANGERFIELD, GAUNT, and WORMALL [this *Bulletin*, 1938, v. 35, 714] for the determination of Bayer 205.

Aliquots of solutions of a variety of amines were diazotized and buffered with acetate; an aliquot of standard hexylresorcinol solution was then added and the development of colour was studied. The orange-red colour obtained with *p*-aminobenzoic acid was selected as the best for the estimation of hexylresorcinol in chopped-up tissues of *Ascaris*. For details of the author's methods the paper itself must be consulted. It was found that the same reaction could be used to detect and determine a large number of phenolic substances as well as hexylresorcinol.

Preliminary experiments showed that hexylresorcinol could be made to pass through the cuticle of *Ascaris* much more easily than through the mouth and anus. When cannulae were put in both ends of the worm saline could be passed through it if sufficient pressure was exerted. But when the cannula was pushed past the powerful oesophageal musculature strong resistance was encountered, which suggested that the other parts of the gut exert a strong pumping action. The gut capacity of worms about 30 cm. long was roughly one-third cc. When one-third to one-half cc. of saline at 37°C., coloured with trypan blue or chicago blue, was injected with a hypodermic syringe through a cannula inserted through the mouth or anus, this solution penetrated for about one-third of the length of the gut, but was often ejected by the worm with considerable force. There was even greater resistance to the injection of a solution containing 1 : 2,000 hexylresorcinol. When the external orifices were excluded by means of ligatures after the injection through the mouth or anus of 0·5 cc. of 1 : 2,000 hexylresorcinol, the worms were paralysed within a few minutes as far as the drug had penetrated; but the rest of their bodies remained active for at least six hours and only slight penetration of the drug was detected. On the other hand, worms kept in 1 : 2,000 hexylresorcinol in saline at 37°C. were paralysed after half an hour whether their external orifices were excluded by ligature or not, and by that time these worms showed strong evidence of penetration of the drug through the cuticle. Worms which were ligatured but not injured lived for 24 hours.

The rate of penetration of hexylresorcinol was studied by ligaturing off the external openings of some worms and not of others and immersing them all in a large volume of 1 : 2,000 hexylresorcinol at *p*H 6·5 and 37°C. Pairs of worms were removed at intervals. The amount of drug penetration was measured by determination of the amount recovered from the tissues. The rate of penetration in both ligatured and non-ligatured worms was of the same order, which was further proof that the main path of entry was through the cuticle. Different worms showed different rates of penetration, which were not correlated with their size nor entirely with their surface area. Penetration of the drug went on until its concentration inside the worm was 5–6 times that in the outside medium and the worms retained the drug. The initial rate of uptake is roughly proportional to the initial concentration in the surrounding medium. The *p*H of the external medium, over the range (*p*H 4–8) used, which exceeds that likely to be encountered by the worm in its host, had no significant effect on the rate of penetration. Anaerobiosis likewise had no significant effect.

The effect of the intestinal contents of the host on the rate of uptake of the drug was studied *in vitro* and by one experiment *in vivo*. For the latter a pig was given 1 gm. of hexylresorcinol and its stomach and intestinal contents were removed five hours later for examination.

Only a relatively small proportion (1 : 30,000) of the drug was present in the unfilterable portion of the intestinal contents and none was found in the stomach.

In the *in vitro* experiments the uptake by *Ascaris* from a 1 : 4,000 solution of hexylresorcinol was tested in the presence of various biological substances at *p*H 6·5 and at 37°C. Among the substances which had no effect on the uptake of hexylresorcinol were degraded, peptonized and completely hydrolysed proteins, Witte's peptone and products of the hydrolysis of ovalbumin. Ovalbumin has, however, some inhibitory effect, but this and other native protein would be partly digested before they reached the site occupied by the worms and therefore might not be inhibitory *in vivo*. This would not, however, be true of mucin, which strongly inhibits the uptake of hexylresorcinol and is usually present around the worms. Among carbohydrates tested, starch seemed to inhibit and 1 per cent. glucose to increase the uptake of the drug. Among fats neither a 1 per cent. suspension of olive oil nor glycerol had any effect, but 1 per cent., 0·5 per cent. and 0·25 per cent. solutions of sodium oleate completely inhibited the uptake ; lower concentrations, however, increased the rate of uptake. The addition of 1 per cent. of ox bile salts caused more than 90 per cent. inhibition of the uptake. Tests done with detergents (saponin, cholic acid, sulphonated laurol, etc.) showed that there is no direct correlation between surface activity of the substance and its inhibiting capacity. The data suggest that the bile salt inhibits the uptake by changing the physico-chemical state of the hexylresorcinol. Results of an investigation of the nature of this change will be published later. It was found that urea, glycerol, thiolacetic acid, sodium salicylate, caffeine, ethyl and amyl alcohol, urethane, chloroform and diethyl aniline neither increased nor decreased the uptake of the drug.

The general conclusions are that the effects obtained *in vitro* most probably occur also *in vivo*. This is very likely in the case of mucin. Absorption of the drug on to mucin may remove it from the sphere of action, but it may also provide a reservoir of the drug from which a continuous supply may be obtained at a low concentration for a long time. The effect of bile salts, on the other hand, is likely to be quite different *in vivo*, because of the interference of numerous components of the complicated emulsion in the small intestine. *G. Lapage.*

CLEARKIN, P. A. **Some Observations on Filariasis in British Guiana and its Treatment.** *British Guiana Med. Ann.* 1943, 1–12. [16 refs.]

After noting that the absence of microfilariae from the blood is not evidence of the absence of filariasis, and that a positive result with Fairley's skin reaction can be accepted as confirmation of the diagnosis even when microfilariae are absent, the author discusses the causation and treatment of some of the symptoms. He points out that the pathological changes observed have been attributed to blocking of the lymphatics by the adult worms, to infection of oedematous and devitalized tissues by haemolytic streptococci and other organisms and to an allergic reaction to the parasite. He discusses the literature on the presence or absence of haemolytic streptococci and other organisms in filarial lesions and concludes that all three of the causes just mentioned operate. The itching, urticaria and arthritis of filariasis cannot, however, be due either to lymphatic obstruction or to bacterial infection. The author thinks that O'CONNOR [this *Bulletin*, 1932, v. 29, 766] is probably right when he attributes them to allergy.

If, the author says, the allergic hypothesis is correct, it may be as well that there is no known method of killing the parasites, because, if large numbers of them were killed, there might be serious anaphylactic shock. ROSE's treatment with streptococcal vaccines [this *Bulletin*, 1918 v. 11, 91 ; 1919, v. 14, 156] has given good results in British Guiana. Originally three injections at intervals of two weeks were given, the first of 100 million killed streptococci and the next two of 200 million each ; but a longer course with a higher terminal dose is now given. Relapses occur, however, and some patients do not react.

The author is now trying desensitization with extracts of *Dirofilaria immitis* of the dog. Dried adult *D. immitis* are ground up and 1 gm. of the powder is extracted with 100 cc. of carbol-saline (0·85 per cent. sodium chloride and 0·5 per cent. of carbolic acid). After refrigeration for 24–48 hours, this extract is passed through a Seitz filter and diluted to 1 : 1,000, 1 : 10,000, 1 : 100,000 and 1 : 1,000,000. Subcutaneous injections of 0·1 cc. of the 1 : 1,000,000 dilution are first given. Injections are continued weekly until 1·0 cc. of the 1 : 1,000 dilution has been given. The rate of increase of the dose is slow at first and depends on whether or not there are focal reactions (itchings, urticaria, oedema or occasionally an attack of filarial fever). Vaccines are given at the same time. It is too early as yet to give results in detail but this treatment "promises to be of value in amelioration of symptoms, prevention of attacks and prevention of elephantiasis." *G. Lapage.*

BURHANS, R. A., CAMP, J. D., BUTT, H. R. & CRAGG, R. W. **Lymphangitis of Suspected Filarial Origin. A Preliminary Report concerning its Treatment.** *U.S. Nav. Med. Bull.* 1944, Feb., v. 42, No. 2, 336–40.

Forty-six men of the United States Navy returned to America from the South Pacific area diagnosed as suffering from lymphangitis, which was thought to be due to filarial infection though no parasites had been found. Since filariasis is of rare occurrence in white men and had not hitherto been reported in naval personnel stationed in the South Pacific, these cases were specially examined.

Length of duty in the island.—The interval between the time of possible exposure to infection and that of the onset of symptoms varied from 3 months to 21½ months ; it is an interesting fact that all developed their symptoms in the four months September to December.

Place of work.—Though a few stayed about the shore most of the men worked inland in the jungle.

Symptoms and signs.—These seemed to be the same in the original attack as in recurrences. In order of frequency the parts commonly involved were : the spermatic cord, epididymis and testicle ; the arm, more frequently the forearm ; the thigh and popliteal space ; the upper eyelid ; and the scrotal sac. The onset usually occurred at night ; the patient would be awakened by a sharp drawing pain in the region involved ; fever was rare, mild and of very short duration and the symptoms were usually only local. When the scrotal contents were involved the first complaint was of soreness and tenderness of one testicle, rarely of both ; this was followed by swelling and often by 'lumps' in the groin. The soreness subsided in three or four days leaving a local swelling of the spermatic cord or testicle and 'lymphatic enlargement.' In the arm or leg, in some cases the lymph glands were swollen

with red streaks of the skin progressing distally, while in others small tender knots or elongated 'lumps' developed along vessel paths or at the edges of muscles; sometimes there was a diffuse thickening of the subcutaneous tissue. Weals, followed by itching, appeared in some patients and disappeared within a few hours. None of the men had elephantiasis but many, on arrival, had swelling of the spermatic cord, epididymis of leg or arm, and nearly all had 'adenopathy.'

In many cases there had been only one attack and these patients were given physical exercises which, however, were followed by recurrence of pain and swelling. During the recurrences eosinophilia was marked in nearly all cases; no microfilariae were found. In the island the eosinophilia had ranged from 3 to 32 per cent., and after return to America it also varied, from 1 to 27 per cent. Biopsies of three lymph glands and three lymph channels gave negative results and no microfilariae were found in hydrocele fluid of one patient.

During the course of these investigations a patient was transferred from another hospital; he had originally returned from the same South Pacific island with similar symptoms and an adult female filaria had been found in a biopsy of a lymph channel near the wrist. The authors consider that they may assume that all these cases are similar in spite of negative laboratory findings.

Treatment.—Sulphonamides had no apparent effect and surgery was not indicated in these cases; X-ray therapy was tried and found to cause prompt decrease in the size of enlarged lymph glands; as improvement remained after exercise tests it was given to all suitable patients according to the following prescription: 140 kilovolts, 15 milliampères, 50 cm. tube-screen distance, filtration through aluminium 1 mm. and copper ¼ mm., doses of 105 r units every other day giving a total of 315 r units including back scatter, to each area. This was followed by 30 days' leave; the men have now returned to hard outdoor work for 4–6 weeks and the results will be reported later.

J. F. Corson.

LOWMAN, E. W. **Incidence of Filariasis in Children.** *U.S. Nav. Med. Bull.* 1944, Feb., v. 42, No. 2, 341–3. [11 refs.]

Microfilariae of *Wuchereria bancrofti* were found in 15·9 per cent. of fresh blood preparations taken from 201 natives of a South Pacific island where elephantiasis was common; the persons examined included infants, children and adults. The incidence of infection was very low in persons less than 20 years old and was highest in those aged 20–35 years; males were infected twice as frequently as females. Microfilariae were found in two children, one aged 2 years and the other 3¼ years. The youngest age at which elephantiasis was observed was 18 years.

The object of the enquiry was to obtain some evidence of the time of exposure necessary for a filarial infection to become discernible so as to be able to estimate the risk to American troops living in the island. Several cases of infection of young children with filaria have been recorded previously, the youngest with *W. bancrofti* in the blood being aged 14 months. The early appearance of filariasis is therefore quite possible and this should be borne in mind by medical officers and periodical examinations should be made. *J. F. Corson.*

LIGHTNER, G. H. & PATTERSON, W. B. **Trichinosis. Report of Four Cases.** *Hawaii Med. J.* 1942, May, v. 1, No. 5, 302–3.

"The clinical picture of trichinosis has been briefly reviewed, and 4 cases of this disease occurring on the Island of Maui have been reported."

DEFICIENCY DISEASES.

THOMSON, E. L. **Beri-Beri: a Description of the Condition in Ratings of the Straits Settlements Royal Naval Volunteer Reserve, and a Commentary on the Clinical Appearance and Diagnosis.** *J. Roy. Nav. Med. Serv.* 1944, Jan., v. 30, No. 1, 6–12. [19 refs.]

An interesting paper and very informative to those who, coming newly into contact with patients in the tropics, know beriberi merely from their text-books, as having dry and wet forms.

The author's remarks are based on 43 cases under his observation during the short period of three months. Many of the patients complained only of loss of appetite, epigastric discomfort and perhaps of "pins and needles" in the fingers and toes, or of weakness, fatigue, shortness of breath and palpitation on slight exertion. On examination, many show an unexpected anaesthesia over the lowest third of the tibia, in the early stages a dulling of sensation, but with hyperaesthesia of the calf muscles of both legs, with stiffness and weakness, and consequent avoidance of walking. Those who work much with their hands usually present both motor and sensory changes in the hands, wrists and arms earlier and more than in the legs. Besides the pricking sensations and numbness, burning, itching and formication are common. All the forms of paraesthesia seem to be worse on cold and wet days. As for motor disturbances, the muscles most often involved are the extensors of the foot, those supplied by the anterior tibial and peroneal nerves being the first to suffer, then the calf muscles, the extensors of the leg and the glutei in that order. In severe cases the intercostals, diaphragm and laryngeal muscles may become involved. The gait is rather of a shuffling than of a steppage character, like "walking in stiff clay."

Wet beriberi should not be regarded as a distinct type, but as "dry beriberi with superimposed oedema." The cardiac symptoms of palpitation, oppression and dyspnoea are often worse at night and, in the acute cardiac type, *shôshin*, there may be signs of acute dilatation: sudden collapse and distress, restless tossing from side to side, and agonizing cardiac pain, oedema of feet, enlarged and pulsating liver.

Signs of other vitamin deficiencies may be, and usually are, present, such as eczematous scrotal dermatitis, cheilosis, burning sensation in the mouth with reddening of the lingual papillae, and, in a few patients, hemeralopia; in others, dryness and roughness of the skin and absence of sweating.

Apart from the symptoms detailed above the "squatting test" is of value in the diagnosis of early cases—pain on assuming the position usually comfortable to the oriental, and difficulty in rising from it without the aid of the hands. The author mentions two other tests

easily applied: (i) Holding the breath. Whereas healthy Malays and Chinese can do this for about a minute, beriberi patients in the subacute stages can only do it for 15–20 seconds; in the severe stages for less than 10 seconds. (ii) Keeping the arms horizontal. Beriberics can do this for 25 seconds or less, the healthy for minutes.

Inquiring into the diet of his patients the author found that it consisted largely of overmilled white Siamese rice, sun-dried in the husk, then threshed and bagged. Improvement set in when this was changed for Grade I parboiled rice, and reconstituted brown bread recently produced in Malaya was substituted for white bread, marmite for coffee, and certain vegetables with high vitamin B content added, such as Katjang-idjoe (*Phaseolatus radiatus*), towgay and tahoo [we cannot trace the botanical names of these]. In four months berberi was no longer to be observed among these ratings and their capacity for physical exertion had been in good part restored. *H. Harold Scott.*

ASHBURN, L. L. & LOWRY, J. V. **Development of Cardiac Lesions in Thiamine-Deficient Rats.** *Arch. Pathology.* 1944, Jan., v. 37, No. 1, 27–33, 1 fig. [19 refs.]

LAHIRI, K. D. **Pellagra in Bihar.** *Indian Physician.* 1943, Dec., v. 2, No. 12, 422–4. [18 refs.]

A report of five cases.

HAEMATOLOGY.

PRASAD, B. N. & CHOWDHURY, N. K. **Normal Haemoglobin Values of the Population of Bihar.** *Indian Med. Gaz.* 1943, Sept., v. 78, No. 9, 429–31.

Considerable variations, most probably dependent on dietary habits and economic status, are common in haemoglobin values of populations in different parts of the world. Thus in Bengal and Assam the haemoglobin values of labourers varies between 11·83 and 13·74 gm. per hundred cc. of blood, while for the middle class and student population the average figure is about 14·50 gm. In Britain the normal value lies between 14·50 and 15·60 gm. and in U.S.A. it is about 16·0 gm. per 100 cc. blood.

In the present survey the population was divided into five groups according to social and economic status and the average haemoglobin values for males and females of each group were determined with a Hellige haemometer calibrated so that 100 per cent. was equivalent to 13·75 gm. Hb. per 100 cc. blood. The first group consisted of labourers, poor cultivators, and service people earning low wages, whose diet was mainly formed of *sattu* (finely crushed parched gram and barley), coarsely crushed maize, *khesari* (*Lathyrus sativa*), potatoes, and occasionally green vegetables and milk. The second group comprised middle-class cultivators, petty craftsmen, small shopkeepers, poor students and poor clerks, whose diets were superior to that of the first group. Group three consisted of landowners, petty zemindars, clerks, students and business men who lived mainly on a diet of rice, deficient in animal products. Group four included large landowners, zemindars,

service people and students, whose diet consisted of rice and *atta* [wheat flour], milk, vegetables and, occasionally, animal products. Group five consisted of zemindars, business men, students of well-to-do families and service people drawing about Rs. 200 per month; these people lived on a mixed diet regularly containing meat or fish.

The average haemoglobin values of the various groups are shown below :—

Group	Average Haemoglobin values in gm. Hb per 100 cc. blood	
	Males	Females
I	10·94	10·12
II	12·42	11·42
III	13·63	13·20
IV	14·12	14·41
V	14·70	13·29
All groups ...	13·63	12·49

The most efficient dietary sources of iron are liver, cereals such as dals and oat, dried fruits such as figs and dates, and green vegetables; red meats, often thought to be rich in iron, have, in fact, little available iron. For adequate assimilation, ionizable iron is more important than the total iron of the diet, and in certain circumstances a vegetarian diet may be superior to a meat diet in this respect. A daily average intake of 10 to 15 mgm. of ionizable iron is required and the investigations indicated that adequate amounts of such iron were being obtained by the great majority of the population of Bihar. A further analysis of the haemoglobin values for varying age groups showed no appreciable difference for males between the ages of 11 and 40, but there was a slightly lowered value between the ages of 41 and 50. In the female population the highest value was found between the ages of 21 and 30, with slightly lowered values between the ages of 11 and 20 and between 31 and 50. *F. Murgatroyd.*

FOY, H. & KONDI, Athena. **Ehrlich's Megaloblasts associated with Low Mean Corpuscular Volume and Red Cell Diameter.** *Lancet.* 1943, Oct. 23, 505–6, 1 chart. [20 refs.]

During the course of a nutritional anaemia survey in the Bechuanaland Protectorate, Africa, Foy and Kondi, came across a case of chronic untreated amoebic dysentery in a nine months' pregnant negress who had been suffering from persistent diarrhoea throughout pregnancy. The red cell count was 2,627,000: haemoglobin 7 per cent., [7 gm. per 100 cc.]: colour index 0·92: white cells 3,440: M.C.V. [mean corpuscle volume] 69 cμ: M.C.D. [mean corpuscle diameter] 6·75 μ. A marrow biopsy showed typical Ehrlich's megaloblasts similar to those found in untreated Addisonian pernicious anaemia and nutritional macrocytic anaemia of India and Macedonia. The authors are surprised to find these cells in an anaemia with low mean corpuscular volume and diameter. [The most likely explanation of the finding, which they do not however discuss, is that the patient was suffering from a dual type of deficiency so often seen in the tropics. If she had been

treated with iron it is not unlikely that the type of anaemia would have changed and that the microcytosis would have given place to macrocytosis.] *Janet Vaughan.*

LEROY, G. & LINHARD, J. A propos de deux affections hématologiques (anémie à hématies falciformes et leucémie myéloïde) observées à Ayos (Cameroun). [**Sickle Cell Anaemia and Myeloid Leukaemia in the French Cameroons.**] *Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* 1943, July, v. 2, No. 3, 219–45. [19 refs.]

VENOMS AND ANTIVENENES.

MAEGRAITH, B. G. **The Identification of the Poisonous Snakes of British West Africa. I.—Keys to Genera and Species.** *Ann. Trop. Med. & Parasit.* 1944, Apr. 19, v. 38, No. 1, 21–34, 8 figs.

A valuable piece of work. The author describes the correct way of making an examination of a snake whose identity is to be determined; the method to be adopted, namely, first the head and the teeth, then the head scales, or shields, next the body scales, dorsal and ventral, the tail and the body markings. These are illustrated by clear line-drawings. He then applies these criteria and gives a list of West African snakes, 25 Colubridae, of which 19 belong to the Opisthoglypha and 6 to the Proteroglypha, and 12 Viperidae, and concludes with a schematic key for the identification of each. *H. Harold Scott.*

WILSON, H. **Acute Abdominal Symptoms in Arachnidism. Black Widow Spider Bite.** *Surgery.* 1943, June, v. 13, No. 6, 924–30. [22 refs.]

The black widow spider *Latrodectus mactans* is found throughout the United States and Canada, and records of bites are becoming more frequent. It is present in woods and fields, but is not infrequently found in garages, basements and outhouses. The author gives a description of the symptoms produced by the bite, especially the muscular cramps and the spreading, excruciating pain; the board-like rigidity of the abdominal muscles may suggest a diagnosis of acute abdominal lesions which has, in a number of cases, led to needless laparotomy.

Many treatments have been tried, and as a result of observations in 56 cases, the author advocates the use of morphine, frequent hot baths (which afford great relief) and injections of specific antiserum. Intravenous calcium gluconate has been recommended, but exerts relatively little effect on the general condition. [Intravenous calcium chloride and magnesium chloride have also been recommended, see this *Bulletin*, 1940, v. 37, 516.]

Mortality is low, though a few authors have reported fatal cases; in the present series there were no deaths. *Charles Wilcocks.*

DERMATOLOGY AND FUNGOUS DISEASES.

CAMPOS, J. A. Hemoculturas nos surtos febrís do pênfigo foliáceo (Fogo Selvagem). [**Blood-Culture in Febrile Exacerbations of *Pemphigus foliaceus* (" Wild Fire ").**] *Hospital.* Rio de Janeiro. 1943, Aug., v. 24, No. 2, 187–98. [22 refs.]

Many organisms have been cultivated from cases of *Pemphigus foliaceus* during the exacerbations: Gram-positive diplococcus by CARRERA, *Ps. pyocyanea* (PETGES and BICHECONNE), *Streptococcus viridans* (FELKE and NAGELL), a Gram-positive coccus, probably a streptococcus (EBERSON) and named [for some obscure reason] *Bacterium pemphigi.* The present author has observed over 600 cases and in this communication deals with 130 in hospital. He states that he cultured the blood during febrile exacerbations; the duration of the patients' illnesses varied from 7 days, *i.e.* an early acute attack, to chronic cases of 30 years' standing. He states that in every one of these he was able to isolate a haemolytic streptococcus in pure culture and he concludes, therefore, that this organism " is the probable cause of Pemphigus foliaceus." [The organism is not defined further and it is possible that a transient streptococcal infection might cause febrile reactions in any chronic disease without being in any way aetiologically related to the disease itself. See also this *Bulletin*, 1927, v. 24, 451; 1943, v. 40, 487, 488.] *H. Harold Scott.*

RODHAIN, J. Quelques données au sujet des teignes au Mayumbe. [**Some Data on the Tineas of Mayumbe.**] *Ann. Soc. Belge de Méd. Trop.* 1943, Mar. 31, v. 23, No. 1, 63–6, 3 figs. on 1 pl.

In the forest region of Mayumbe, Belgian Congo, the author observed, in children of 6 to 15 years, an unusual type of favus in which the whole scalp area is recovered by yellow crusts with a great deal of white scaly matter, giving the appearance of a white helmet. It is probably similar to the " witkop " of natives in South Africa. In some cases the typical favic cup was found also on the shoulder or breast. All cases were proved microscopically and by culture of *Achorion schönleini.* In contrast to the favus of Europe, the Congo disease tends to resolve spontaneously at puberty, like that described by CATANEI in Algiers.

An endothrix type of trichophytosis was also observed, and the causative fungus was identified as probably *Trichophyton soudanense* Joyeux, previously found in the Sudan and the southern, desert area of Algeria. It is much like the *T. sulphureum* of Britain.

J. T. Duncan.

O'DALY, J. A. La cromoblastomicosis en Venezuela. [**Chromoblastomycosis in Venezuela.**] *Rev. Sanidad y Asistencia Social.* Caracas. 1943, Aug., v. 8, No. 4, 655–79, 8 pls. [31 refs.]

Chromoblastomycosis has only come to knowledge in Venezuela in recent years, the first case having been recorded in August 1937 and, says the author, three cases only have been already published. Search through the literature has revealed 58 cases in S. America, 34 in Central America, 7 in N. America, 3 each in Europe, Asia and Oceania, and 2 in Africa; 110 in all. Three genera are known as causative: *Fonsecaea, Hormodendron* and *Phyalophora.*

The author gives a general account of the condition, with notes of five cases: (1) A man of 50 years with ulcerating, fungating lesions of the right foot from which *F. pedrosoi* was isolated. (2) A man of 37 years with verrucose nodules of the lower part of the right leg, due to the same fungus and starting five years previously. (3) A man of 40 years showing scars of healed ulcers and other ulcers unhealed on the lower part of the left leg, dating back about three years. The patient was in apparent good health, but the Wassermann and Kahn reactions were both 4 plus. (4) A negro of 70 years, blind, with fungoid growths on the right gluteal region. (5) A man of 24 years with a historyof a lesion starting three years before as a papule, which did not heal but was not painful; it spread and was surrounded by satellite papules which later became painful and bled easily.

The lesion usually arose in some site of small injury, such as the prick of a cactus thorn. Iodide in large doses for a long time may do good but surgical treatment is almost always needed. *H. Harold Scott.*

SCHLUMBERGER, H. G. & SERVICE, A. C. **A Case of Histoplasmosis in an Infant with Autopsy.** *Amer. J. Med. Sci.* 1944, Feb., v. 207, No. 2, 230–39, 7 figs.

Little is known of the epidemiology of histoplasmosis. The disease has attacked persons in all age groups and several cases have been reported in very young children. The present paper describes a case in a male infant aged only seven weeks—the youngest case on record. The child was born by normal delivery after eight months' gestation, and was never breast-fed. After two weeks in hospital (probably in Philadelphia), the child was taken to its mother's home for a month, and then to another hospital. The time and source of infection are not known but it is presumed to have occurred during the month spent at home. At seven weeks the child was suffering from bronchitis and secondary anaemia with associated enlargement of the spleen and liver. At nine and a half weeks it died.

Diagnosis of histoplasmosis was made from spleen and bone marrow smears two days before death. A good account is given of the *post-mortem* findings, especially the morbid histology, which is well illustrated by photomicrographs. The lesions were diffused throughout the body but the greatest changes occurred in the spleen, liver and lungs.

Although the fungus was easily cultivated from biopsy material taken two days before death, attempts to cultivate it from materials taken one hour after death failed. Mice inoculated intravenously with the culture died in three to four months, and a description is given of the morbid histology in these animals. *J. T. Duncan.*

MISCELLANEOUS.

BULMER, E. **A Survey of Tropical Diseases as seen in the Middle East.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Feb., v. 37, No. 4, 225–36. Discussion 236–42 [SCOTT, H. H., Chairman; BARBER, C. H., MANSON-BAHR, P.; BUXTON, P. A.; CHESTERMAN, C. C.; MORTON, T. C.; STANNUS, H. S.; MACDONALD, G.; FELIX, A.; BOYD, J. S. K.; BULMER, E. (in reply).]

In 22 months at a military hospital in Egypt, with 1,200 beds, there were about 17,000 medical admissions; the patients were chiefly of

British stock, but a native section of 47 beds provided an opportunity for seeing non-indigenous tropical diseases. The total sickness rate was low, the average number of admissions of sick and wounded representing about 8 per cent. of the Force. The proportion of medical to surgical admissions was three to two.

Of the medical admissions tropical diseases accounted for 40 per cent., or if desert sores are included, 50 per cent. Two-thirds of the tropical cases were acute diarrhoeas and one-third "pyrexias with possible splenomegaly". The usual stay in hospital was between two and three weeks, with often another week at a convalescent depot. The incidence of non-tropical diseases was generally similar to that in England, with the notable exception that chronic dyspepsia accounted for only 4 per cent. of the admissions.

Probably every soldier in the Middle East Force had at least one attack of acute diarrhoea, usually soon after arrival, and it was considered that only about 6 per cent. of those reporting sick with diarrhoea were sent into hospital. Some immunity seemed to be developed as in the second summer acute diarrhoea was rare excepting among newly arrived troops. The seasonal incidence showed two main peaks—in early and in late summer—the drop at the height of the summer being associated with the diminution in the numbers of flies. Cases of dysentery were rapidly classified clinically into those with blood and mucus in the stools and those without. The latter, whose condition was termed "acute catarrhal enteritis," were the mildest cases and accounted for 56 per cent. of the dysenteries; their average stay in hospital was 10 days. The former group, described as having "clinical dysentery," included 20 per cent. of mild, 22 per cent. of moderate and 2 per cent. of severe cases, and their average stay in hospital was 20 days. Dysentery was treated as a clinical problem and no fetish was made of attempting to isolate dysentery bacilli, but of a large number of isolations, Flexner organisms formed 70 per cent., Shiga 19 per cent., Sonne 6 per cent., and Schmitz 5 per cent.; the recorded incidence of amoebic dysentery was only 1 per cent.; treatment of the bacillary infections consisted of strict rest in bed, morphine for severe pain, water only by mouth for 12 hours, then a graduated bland diet until the stools were normal; sulphonamide drugs were given in selected cases. Dehydration was rare and was corrected by transfusions of plasma or blood. Salts and castor oil were not used. Sixty-three patients were treated with sulphanilamide but the results were poor. Sulphapyridine was used in ninety-seven cases with results nearly as good as with sulphaguanidine, but it produced severe nausea, vomiting, and malaise. Three hundred and six cases were treated with sulphaguanidine, the routine suggested dosage being an initial dose of 6 gm. followed by 3 gm. every four hours until the stools were two to three daily, and then 3 gm. thrice daily for another two to three days; there were no subjective toxic effects but four cases of rubelliform rash about the tenth day and one of "sulphaguanidine kidney," with recovery, occurred. With sulphaguanidine the dysenteric symptoms rapidly abate, malaise disappears, stools diminish in number and sigmoidoscopic examination confirms the resolution of the inflammatory process. Of 203 severe or moderate cases the average stay in hospital was 17 days, and there were only two deaths in the series of patients treated with the drug.

Some 2,000 patients were admitted to hospital with a clinical picture that was closely similar, namely pyrexia (often heralded by rigor),

severe headache, vomiting and often pain on moving the eyes, but with no physical signs beyond (frequently) splenomegaly and "pink eye." Of these, 735 had malaria and 19 had relapsing fever. In 1,153 cases the patients recovered in a few days and it was considered that 805 of them had sandfly fever, while in 348 the diagnosis remained quite obscure. Of the malaria infections 81 per cent. were benign tertian, 6 per cent. malignant tertian, 1 per cent. quartan, while 11 per cent. were diagnosed as "clinical malaria"; the standard Army treatment was used and the relapse rate was low.

Among 10,000 prisoners of war the occurrence of scurvy led to a modification of the diet by which the vegetables were increased at the expense of the meat. This was followed by an outbreak of diarrhoea and in a fatal case the question of pellagra was raised. Examination then revealed over 1,000 cases of pellagra, of which about 200 were moderately severe and 31 severe. They were treated with nicotinic acid and the addition of milk, peanuts and meat to the diet.

A few cases of beriberi occurred in the long distance desert groups, and in the besieged Tobruk garrison. There were 19 cases of relapsing fever which appeared to be tick-borne; spirochaetes were scanty, neurological complications included lymphocytic meningitis and cranial or other nerve palsies, and the disease was resistant to most drugs though the author thought stovarsal was effective. Schistosomiasis occurred in 18 patients and kala azar was found in six. No case of heat hyperpyrexia was seen, but there was one fatal case of heat exhaustion in a soldier landed from the Red Sea during a heat wave.

In the discussion following this paper the CHAIRMAN (Sir Harold SCOTT) pointed out that in previous wars the ratio of medical to surgical cases was 20 or more to 1. In the South African War he had seen wonderful results with concentrated solutions of magnesium sulphate in dysentery, the stools being reduced to three or four within 24 to 48 hours. Lieutenant-Colonel BARBER mentioned that the value of the ordinary topee in the prevention of heat stroke was negligible. Sir Philip MANSON-BAHR recalled his experiences with dysentery in the last war. He endorsed the efficacy of sulphaguanidine treatment and wished that the claims of bacteriophage could be finally confounded. He suggested that many of the pyrexias of undetermined origin might be due to subtertian malaria and enquired whether sternal puncture had been found of any value in diagnosis. Air-Commodore MORTON referred to desert sores and their occasional association with diphtheria infection. Dr. STANNUS thought that the failure to prevent dysentery in a stationary camp, and pellagra in a Libyan internment camp, was of great significance, and he asked for information regarding the method of transmission of the dysentery. Brigadier MACDONALD thought it important that military medical officers should receive a basic training for overseas duty, in the United Kingdom, and that this should be supplemented abroad by instruction in the locally important diseases and their control. He asked that judgment should be reserved on the apparent failure to control dysentery as figures would probably show later that the incidence of disease was in fact much lower than in previous campaigns. Dr. FELIX drew attention to the treatment of typhoid with anti-typhoid Vi+O serum. Professor BUXTON had found that house flies were rare even in kitchens and messes in the Middle East, and he did not believe the dysentery was fly-borne. Colonel BOYD said that amongst 60,000 cases of dysentery the incidence of amoebic dysentery was less than 5 per cent., and that of the dysentery

bacilli isolated, Shiga formed 20 per cent. The effect of anti-dysenteric serum is short lived but—given together with sulphaguanidine—it is valuable in acute toxic cases. There was no evidence that bacteriophage had any prophylactic value against dysentery and there was no statistically significant difference between the results of bacteriophage and ordinary saline treatment. *F. Murgatroyd.*

MURRAY-LYON, R. M. **Important Diseases affecting West African Native Troops.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Mar., v. 37, No. 5, 287–96. Discussion 296–302. [LOW, G. C.; CHESTERMAN, C. C.; MANSON-BAHR, P.; HAWES, R. B.; STANNUS, H. S.; CAMERON, I. G.; BOMFORD, T. L.; FELIX, A.; SCOTT, H. H. (President); MURRAY-LYON, R. M. (in reply).]

This survey is based upon experience among native African soldiers drawn from all parts of the West Coast of Africa. A high proportion of the patients suffered from non-tropical respiratory diseases, which accounted for almost a third of all the medical admissions to hospital; pneumonia rapidly responded to sulphapyridine, the death rate was low and complications rare. Other important non-tropical conditions were chickenpox, cerebrospinal fever and vaccinia. The chickenpox was usually mild but there was a number of very severe cases; in the latter the distribution of the rash was more that of smallpox with maximum lesions on the face and periphery of the limbs, although lesions were always present on the trunk. When chickenpox attacked patients already under treatment for trypanosomiasis there was rapid deterioriation in their condition, shown both clinically and by an increase in cells and protein in the cerebrospinal fluid. Cerebrospinal fever was frequently fulminating in its onset but the majority of cases responded well to sulphapyridine; many of the patients at no time showed typical clinical signs so that it became a routine to examine the cerebrospinal fluid of all acutely ill patients not showing definite localizing signs of other diseases.

The vast majority of African soldiers were found, on admission to hospital, to have several tropical infections and it was sometimes difficult to decide what was the actual reason for reporting sick. Helminth infections, being practically universal, had to be ignored unless the infestation was heavy and giving rise to very definite signs and symptoms. Patients suffering from trypanosomiasis were usually admitted to hospital because of cervical adenitis, increasing lethargy, persistent headaches, or falling off in efficiency, which was often first noticed by their officers. Diagnosis was made by gland puncture, trypanosomes being rarely found in the peripheral blood, and about half the patients had changes in the cerebrospinal fluid. Routine treatment, from which no toxic effects were observed, consisted of four doses of 1 gm. of antrypol at 5-day intervals followed by a course of tryparsamide in 2 gm. doses up to a total of about 24 gm. Tropical myositis was chiefly seen in natives of the Cameroons and eastern provinces of Nigeria; the causal factor was not determined, and sulphonamide drugs did not appear to influence the course of the condition.

Dyspnoea, weakness and oedema were the most prominent manifestations of vitamin B deficiency, and occurred chiefly in new recruits enlisted from up-country bush villages, being rare among men on army rations; there was no appreciable albuminuria in these cases,

the blood pressure was low, and there was tachycardia with cardiac enlargement, while diminished deep reflexes, hyperaesthesia of the calf muscles and hypoaesthesia over the shins were also found. Other evidences of vitamin deficiency included angular stomatitis, thickening of the scrotal skin, "crazy pavement" skin over the dorsum of the foot and anterior aspect of the leg, and atrophic glossitis. Treatment consisted of rest in bed, adequate diet and large doses of marmite. The sickle cell trait was found in the blood of 20 per cent. of all patients examined, but in only a few were there any symptoms or disability, and any anaemia present was usually due to some other cause, such as hookworm disease, malaria, yaws or nutritional deficiencies; thrombosis in sicklaemia might lead to symptoms suggesting perforation of a peptic ulcer, acute osteomyelitis, as well as cerebral lesions. Malaria produced little sickness in the Africans except on moving from one colony to another, when a certain proportion developed acute attacks; the symptoms frequently subsided spontaneously or after a few days' treatment, and no case of blackwater fever was seen among Africans.

Dysentery was second only to respiratory diseases in its incidence and bacillary infections were approximately twice as common as amoebic; none of the patients was dangerously ill and only one case of Shiga infection was found. Bacillary dysentery was treated with sodium sulphate or, if the patient was severely ill, with sulphapyridine, sulphaguanidine or succinylsulphathiazole; amoebic dysentery was treated with a course of ten daily injections of 1 grain emetine hydrochloride followed by 3 grains of emetine bismuth iodide and 8 grains stovarsol daily for one week. It is recorded that there were numerous cases of dysentery due to *Balantidium coli*, which cleared up satisfactorily when treated with sodium sulphate in the way used for mild bacillary dysentery. Hookworm infestation was common, but, since toxic hepatitis was frequent after treatment with anthelmintics, as it was after treatment with arsenical drugs, the use of carbon tetrachloride was discontinued. Liver disease appeared to be very common in the African natives; it was unusual to find a normal healthy liver at autopsy, whatever might have been the cause of death, most livers showing some evidences of cirrhotic changes, even in patients under 30 years of age. [The exact pathology of these liver changes and their possible relation to dietary deficiency would be worth studying.] Yaws was a major cause of disability, and large numbers of the native troops had bone and joint or skin lesions. Murine typhus was not uncommon; a rash was not typically seen and some patients had diarrhoea, suggesting typhoid; the pulse rate, however, was higher than in typhoid and agglutination tests showed no rise in the Widal response but a rising titre against *Proteus OX19*. The fever lasted about 10 days and the temperature then fell by lysis. All the patients recovered, and treatment was but symptomatic.

In the discussion which followed this paper, CHESTERMAN stated that in 16 years' experience he had never seen an empyema in an African native although, before the introduction of sulphonamide drugs, the mortality from pneumonia was very high. In view of the deterioration in patients suffering from trypanosomiasis when varicella supervened, he wondered whether the varicella virus brought about some breakdown of the barriers, allowing the trypanosomes to get through to the central nervous system. MANSON-BAHR remarked on the rarity of jaundice in amoebic hepatitis in his experience; he had seen it only twice, and in both of these cases there was a suspicion that the patient

was also suffering from infective hepatitis. HAWES drew attention to the possible association of dietary deficiency and liver damage. Carbon tetrachloride appeared to be dangerous when the diet lacked calcium or first-class protein ; alcohol also increased the toxicity of the drug. STANNUS raised the question of schistosomiasis being a contributing factor in the production of carcinoma of the liver. CAMERON compared the high splenic and malaria parasite indices in West African natives with the low rates in the populations of Malaya, where strict anti-malarial control had existed for many years. He had recently heard of two cases of blackwater fever in African natives, and wondered whether treatment of malaria might not break down immunity and possibly make blackwater fever more common in the future among the natives. BOMFORD commented on the difficulty sometimes experienced in differentiating clinically between yaws and chickenpox. He mentioned that he had encountered cases of psychoneurosis in African natives and that a common symptom was hysterical paralysis of the right arm. The PRESIDENT raised the question whether the severe cases of chickenpox might not have been cases of alastrim. MURRAY-LYON (replying to several points raised in the discussion) said that syphilis was rare, but other venereal diseases, especially gonorrhoea, were very common among the African soldiers. Jaundice was quite definitely seen with amoebic infections of the liver. No cases of enteric fever were seen in Africans or Europeans. With murine typhus, the rising titre against *Proteus OX19* occurred late, in some cases as late as the 21st and up to the 30th day ; the rise of titre varied from 1 : 200 to 1 : 1,000. There were many cases of infective hepatitis in Europeans within three months of inoculation with two batches of yellow fever vaccine used in October 1942 and December 1942. *F. Muragtroyd.*

KARK, S. L. **A Health Unit as Family Doctor and Health Adviser.** *South African Med. J.* 1944, Feb. 12, v. 18, No. 3, 39–46.

This account of a most interesting work [a note of which was recorded in this *Bulletin*, 1942, v. 39, 892] brings out certain features of great importance. The health unit in question is established in the Polela district of Natal, South Africa, and is undergoing a process of growth and development. Its work is hampered by the lack of political development in the African population ; there is no elected local council to represent the people, the chiefs have little authority, and are often unaware of their communal responsibility. [This seems to be an important point. No doubt much can be done for such communities by the activities of Government departments, but it seems unlikely that advances can be carried through to satisfactory completion unless a community spirit is engendered and organized. The tribal system, with its chiefs, may not be able to achieve a proper sense of responsibility.] The only social unit with real community spirit is the family, and the work of the health unit has been based, therefore, on the family. Most of the illnesses are infective or nutritional, and usually implicate more than one member of a family.

The area is divided into four parts, in each of which one health assistant works, spending at least two working days each week there. The homes have been mapped, censuses taken, standards of education assessed, and records have been made of housing, livestock, and crops. Vital records and accounts of illnesses are kept and all persons attending the Polela Health Unit Clinic are registered on family index cards. Most of the school-children have been examined.

The vital records of a community of 887 persons for 1942 show :— birth rate 45, death rate 38 per 1,000 population, and infant mortality rate corresponding to 275 per 1,000 live births [these rates are not, of course, claimed to be accurate, the totals are too small ; they are given because they provide some rough standard of assessment]. The high death rate was not due to any epidemic.

Sanitation is very primitive, but some progress is being made in the construction of pit latrines ; the author draws attention to the very strong superstition held by Africans in relation to faeces. Composting of animal and garden refuse has been introduced, and will probably became more popular. The health unit is attempting to combat malnutrition by a programme of garden improvement and the institution of measures to prevent soil erosion. Lectures and demonstrations on gardening are held regularly, seed is distributed, and a model garden is maintained at one of the schools.

The housing problem is difficult, and there can be little real advance until residential zoning is undertaken and village settlements are encouraged.

Medical inspection is carried out by the medical officer, who has had the opportunity of examining almost half the community within 18 months. Two of the chief diseases are syphilis and typhoid. For the former the author reports some progress in that many of the women and children are willing to undertake treatment courses of considerable length, though men do not attend so well. Immunization against typhoid has been applied with some success, again especially in women and children.

In a discussion of the health service the author calculates that one doctor is needed for every 4,000 of such a population, but that with proper assistance, and under conditions of overwork, he could supervise 8,000.

[This is a stimulating paper, and the principles on which the unit are conducted appear to be very sound. For a satisfactory health service it will be necessary for the Africans themselves gradually to assume more responsibility; and there is evidently scope in these organizations for African medical men.] *Charles Wilcocks.*

i. PARRAN, T. **Public Health Implications of Tropical and Imported Diseases. Strategy against the Global Spread of Disease.** *Amer. J. Pub. Health.* 1944, Jan., v. 34, No. 1, 1–6.

ii. SAWYER, W. A. **Public Health Implications of Tropical and Imported Diseases. Yellow Fever and Typhus and the Possibility of their Introduction into the United States.** *Ibid.* 7–14. [20 refs.]

iii. McCOY, O. R. **Public Health Implications of Tropical and Imported Diseases. Imported Malaria.** *Ibid.* 15–19, 1 fig.

iv. MELENEY, H. E. **Public Health Implications of Tropical and Imported Diseases. Public Health Aspects of certain other Diseases to which our Military Forces may be exposed.** *Ibid.* 20–26. [11 refs.]

These papers are general statements of facts well known to medical men with tropical experience who have studied the effects of war on the spread of disease, and of the spread of disease on war. It is well that such authoritative declarations should be recorded, and the subject matter so well presented in these papers would form admirable preliminary lectures to medical officers proceeding overseas on war duties.

The first paper deals with the widest aspect; the remainder have a greater interest for medical men in the United States who may have to consider, and perhaps cope with, diseases brought back by returning troops.

i. PARRAN goes over the preliminary ground of the extent to which disease may be expected in military forces operating in the tropics, and the broad outlines of protection of the troops and of the peoples of the world in the face of modern transport facilities. This lecture could, with great advantage, be delivered to non-medical commanders in the field; it sets out the aims of the medical departments clearly.

ii. SAWYER deals particularly with yellow fever and typhus, especially emphasizing the danger of the former to the peoples of the far east.

iii. McCOY writes of malaria. The problem is well enough known in troops in the endemic areas, but he lays special stress on the likelihood of returning troops bringing their infections with them, relapsing and originating outbreaks in non-endemic areas.

iv. MELENEY discusses cholera, present in the people of the far east, a menace to the troops there, but unlikely to be introduced effectively into the United States, dengue and sandfly fever, sleeping sickness (pointing out that tsetse have been found in aircraft reaching Brazil from Africa), and some of the helminthic diseases. Returning soldiers may introduce schistosomes which may find intermediate hosts indigenous to the United States, though these are not known at present. Bacillary dysentery, amoebiasis, typhoid and coccidioidomycosis are also discussed.

The symposium contains no new facts, but when so many medical men are entering a strange field of disease, it is desirable that plain, broad outlines, such as these, be set before them in a proper perspective. *Charles Wilcocks.*

HUDSON, E. H. **Tropical Medicine: its Scope and Present Status.** Reprinted from *Scientific Monthly.* 1944, Jan., v. 58, 42–8.

DEVINE, J. **A Note on Desert Sores.** *Med. J. Australia.* 1943, Oct. 2, v. 2, No. 14, 261–2, 1 fig.

Three types of desert sore have been recognized:—(1) That in which a small blister appears, which later breaks down. This type was rare in Tobruk. (2) Post-traumatic, arising from a scratch or abrasion. (3) Resulting from a skin infection, usually a boil.

Whatever the origin, these ulcers, if neglected, show little tendency to heal. The author discusses the reasons for this. The bacterial flora is so varied that no one organism has been satisfactorily incriminated; in Tobruk deficiency of vitamins B and C was not probable. LOUW [this *Bulletin*, 1942, v. 39, 485] has noted that ulcers are rare in transport drivers, and has suggested that the reason is that their skins are kept supple by oil; Devine, however, takes the view that sweat acts as an irritant which prevents healing, and that transport drivers do not normally perform work which leads to heavy sweating, and that their skins are kept dry by the movement of air. The heaviest incidence of ulcers in Tobruk was in men from field bakeries, who worked in conditions of great heat, and in the actual fighting men who in the front line sweltered in unsheltered holes, and in the back areas undertook heavy physical work. "The quartermaster's staff never seemed to appear on sick parades with desert sores."

Any kind of treatment seems to be successful in the early stages, but if neglected the sores linger on until some stimulus is applied. They usually heal if the patient is rested in bed. The most popular treatment was daily application of sulphanilamide powder, but a comparison of this method with one in which eusol or cod-liver oil was applied until the ulcer was fairly clean, after which it was occluded by elastic strapping, showed no advantage for sulphanilamide. If much skin has been lost, skin grafts should be used, but only if haemolytic streptococci have been removed by saline baths and sulphanilamide.

Charles Wilcocks.

PANJA, D. & GHOSH, L. M. **Report on the Occurrence of Naga Sore in Calcutta.** *Indian Med. Gaz.* 1944, Jan., v. 79, No. 1, 17–19.

Tropical ulcer (Naga sore) has not hitherto been reported from Calcutta or its neighbourhood though it is present in Assam; since July 1943, however, hundreds of cases have occurred in Calcutta and its suburbs, those affected being destitute, famine-stricken people who have crowded into the city. The authors think that the infection was brought into Calcutta by evacuees from Assam and that it has spread rapidly owing to the exceptionally favourable conditions offered by the monsoon season, debility, overcrowding and dirt.

Treatment.—The slough is first removed; this may be done forcibly with a cotton swab soaked in a solution containing copper sulphate 2 dr., phenol 1 dr., water 1 oz., or gradually by dressing with magnesium sulphate either in powder or saturated solution. The ulcer is then dusted with sulphathiazole powder or sulphanilamide powder either alone or mixed with an equal part of boric acid. Alternative applications are: (1) a solution of brilliant green, 5 grains, and zinc sulphate, 2 grains, in 1 ounce of water; (2) triple dye solution containing acriflavine, 0·1 per cent., brilliant green and gentian violet each 0·25 per cent. in water. Later, acriflavine ointment, ½ per cent., may be used.

J. F. Corson.

ALARCÓN, C. J. & GENATIOS, T. Los injertos dermo-epidermicos en el tratamiento de las ulceras de las piernas. [**Thick Skin-Grafts in Treatment of Ulcers of the Leg.**] *Rev. Sanidad y Asistencia Social.* Caracas. 1943, Aug., v. 8, No. 4, 783–96.

Before resorting to surgical treatment and grafting the authors make trial of local dressings, such as alcoholized water (8 spoonfuls of absolute alcohol to a litre of boiling water) with sulphate of copper 2–4 per mille or 1 : 5,000 potassium permanganate. If at the end of 2–3 days the ulcer is not disinfected sulphanilamide powder or ointment is applied. If the ulcer is deep an ointment of carbonate of iron and oxide of zinc (Fe subcarbonate 10, ZnO 20, lanolin and vaseline $\overline{aa}$ 50 parts). When the ulcer heals to the level of the surrounding skin the iron is omitted and an ointment of 50 per cent. cod liver oil with a lanolin base is used. The cod liver oil seems to incite epithelialization and cicatrization.

For surgical treatment they use the thick graft, "pinch graft"; these are placed at least 1 cm. apart and the 10 per cent. cod liver oil ointment dressing applied on gauze, covered with cotton-wool and firmly bandaged; this is repeated in three days and thereafter on alternate days. The grafts usually proliferate in 8–10 days and cicatrization starts by the third week. If the dressing with the oil has been too

scanty or the first re-dressing is delayed, some of the grafts may separate. Once cicatrization occurs the following paste is applied: zinc oxide, talc, glycerin and water in equal parts.

In their summary the authors state that they have treated 300 cases of ulcer of the leg in this way, using altogether 7,892 grafts, the largest number at one time being 140 and the greatest number at several sessions on any single patient was 200. Many ulcers, after existing for as long as ten years, had healed in less than four months.

H. Harold Scott.

HEILIG, R. & VISVESWAR, S. K. **Tropical Eosinophilia.** *Indian Physician.* 1943, Sept., v. 2, No. 9, 305–11, 2 figs. on 1 pl.

Tropical eosinophilia, whether it prove to be a clinical syndrome of varied aetiology or a definite disease, may be said to be characterized by a leucocytosis (to 70,000 or more), a high eosinophilia (perhaps in the neighbourhood of 90 per cent.), asthma-like attacks, numerous small opacities in the lungs revealed by X-rays, and ready response to treatment by arsenicals. Nearly all the patients hitherto described have resided for a time in Bombay or somewhere on the west coast of India.

Two cases here described, in men of 30 and 32 years, were in the main typical, but the leucocytosis was not above 24,500 and 18,600, and the percentages of eosinophiles not above 66 and 40 respectively. Both patients made a good recovery in 4–5 weeks after N.A.B. injections were started.

The authors discuss the differential diagnosis, in particular from Loeffler's syndrome, in which there are leucocytosis (rarely above 15,000), eosinophilia (10–50 per cent.), early fever and varying lung conditions revealed by X-rays—irregularly outlined dense areas on both sides, small infraclavicular infiltrations, multiple circular densities or infiltrations resembling tuberculosis. The lung infiltrations vary and even disappear spontaneously in 3–8 days. Cases like this have been recorded outside India, from the United States of America, for example. Since the symptoms and signs generally are so similar, the differences being of degree rather than of kind, they may be allied and both be indications of some allergic state. [See this *Bulletin*, 1944, v. 41, 517, where other references are given.] *H. Harold Scott.*

MUWAZI, E. M. K. & TROWELL, H. C. **Neurological Disease among African Natives of Uganda: a Review of 269 Cases.** *East African Med. J.* 1944, Jan., v. 21, No. 1, 2–19.

There is a widespread idea among medical men practising in the tropics that nervous diseases are, with the exceptions perhaps of cerebrospinal fever and cerebral malaria, generally speaking rarely met with. This article serves a useful purpose, therefore, in pointing out that this idea is erroneous. The authors have analysed 269 cases among Africans and find that among them were cases of virus encephalitis [the virus was not identified], neurosyphilis, syphilitic thrombosis and cerebral haemorrhage, cerebral malaria and meningitis (meningococcal, pneumococcal and one tuberculous), epilepsy, and even one of syringomyelia. There is no mention of mental disease, unless hysteria and neuroses would come under that heading. [In the opinion of the abstracter the value of this contribution would have been even greater if certain of the conditions mentioned had been

omitted, as showing no peculiarities among native races or as not being regarded usually as "neurological disease." Of such, for example, the authors include the coma of pneumonia and uraemia (but not that of typhoid fever), tetanus, and relapsing fever (one case "with slight meningeal signs".] *H. Harold Scott.*

SHEARER, W. S. **Ainhum: a Case Report.** *Brit. J. Radiology.* 1944, Jan., v. 17, No. 193, 25, 1 fig.

A case of ainhum in an Indian soldier is recorded. The radiograph shows narrowing of the shaft of the first phalanx of the 5th toe and fusion of the second and third phalanges of the 4th and 5th toes. [See also this *Bulletin*, 1942, v. 39, 487.] *J. F. Corson.*

HUGHES, J. P. W. **High Altitude Physiology and the Reaction of the Migraine Subject.** *East African Med. J.* 1944, Jan., v. 21, No. 1, 20–24.

YEAGER, J. F. & WILSON, C. S. **Circa 42, a New Itch Remedy.** *J. Lab. & Clin. Med.* 1944, Feb., v. 29, No. 2, 177–8.

The preparation called "Circa 42" contains two local anaesthetics, benzyl alcohol, which acts quickly and for a short time, and *n*-butyl-*p*-aminobenzoate ("Butesin"), which acts more slowly but for a longer time; the formula is as follows:—

n-butyl-*p*-aminobenzoate...	100 gm.
benzyl alcohol	170 cc.
anhydrous lanoline (melted)	20 ,,
corn-starch	640 gm.
sodium lauryl sulphonate	64 ,,

The benzyl alcohol is warmed and the *n*-butyl-*p*-aminobenzoate is dissolved in it; the melted lanoline is added, with stirring, the mixture being kept warm. This mixture is then added gradually to a mixture of the corn-starch and sodium lauryl sulphonate and the whole is thoroughly mixed. A little more benzyl alcohol is finally added until the preparation has the desired doughy, non-greasy consistency.

It is not rubbed into the skin but smeared on it and allowed to dry.

Itching of the skin, caused by insect bites and other agents, is relieved by it, the effect usually lasting at least for several hours.

J. F. Corson.

PEMBERTON, C. E. **Insects and other Arthropods of Medical Interest in Hawaii.** *Hawaii Med. J.* 1943, Mar.-Apr., v. 2, No. 4, 191–4.

The mosquitoes mentioned are *Culex quinquefasciatus* (stated to be a vector of dengue and filariasis where these diseases occur), *Aëdes albopictus* and *Aëdes aegypti*. No anophelines have ever become established in the islands, though they are being brought by aircraft in increasing numbers. The airplanes are spray-treated on arrival. Of the fleas *Xenopsylla cheopis*, *Nosopsyllus fasciatus* and *Tunga penetrans* have importance for man. *Rhipicephalus sanguineus*, *Latrodectus mactans*, *Pediculus humanus capitis* and *Phthirus pubis* also occur, but there is no mention of the body louse. The other arthropods named are of slighter importance in human disease. *Charles Wilcocks.*

DE MEILLON, B. **New Records, and New Species of Nematocera (Diptera) from the Ethiopian Region.** *J. Entom. Soc. Sthn. Africa.* 1943, v. 6, 90–113, 6 figs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Mar., v. 32, Pt. 3, 59.]

This paper includes descriptions of seven new Ceratopogonids and four new mosquitos, two of the genus *Anopheles*. These are *A.* (*Neomyzomyia*) *radama*, sp. n., from Madagascar and *A. coustani* subsp. *caliginosus*, n., from the Belgian Congo.

GURNEY, A. B. **A Mosquito Survey of Camp Crowder, Missouri, during 1942.** *J. Econom. Entom.* 1943, Dec., v. 36, No. 6, 927–35.

MCGREGOR, T. & EADS, R. B. **Mosquitoes of Texas.** *J. Econom. Entom.* 1943, Dec., v. 36, No. 6. 938–40, 1 fig.

MCGOVRAN, E. R. & FALES, J. H. **Activated Pyrethrum Mosquito Spray.** *Soap.* New York. 1944, Feb., v. 20, No. 2, 117, 119.

It has been shown that the addition of certain substances, for example sesame oil and isobutylundecylenamide, to household sprays which contain pyrethrum, leads to an increased kill of houseflies (*Musca domestica*), when the spray is employed for controlling this pest. Such materials, commonly called "activators," are of negligible toxicity in themselves. Many are more easily available than pyrethrum, which is in short supply, so that under the present circumstances, with troops in malarious areas, it was important to decide whether they would be effective against mosquitoes also. Sugar-fed batches of *Aëdes aegypti* 3–6 days old were used as the test insects. The Peet-Grady procedure for comparing insecticides was followed except that the dose of spray applied was reduced to 6 cc. per 126 cu. ft. chamber and the exposure time to 5 min. After a 10 minutes airing period the insects were all collected and the number knocked down counted, no distinction being made between males and females. The insects were all transferred to a recovery cage and the percentage kill of females was determined after 16–24 hours. Females are more resistant than males.

Both sesame oil and isobutylundecylenamide produced a distinct increase (22 per cent. and 8 per cent. respectively) in mortality when added at various concentrations to pyrethrum sprays, containing 0·033 mgm./cc. pyrethrins. The isobutylundecylenamide was itself slightly toxic in kerosene solutions. The increase in mortality is much less than that which has been reported on houseflies.

W. A. L. David.

CARTER, R. H., MANN, H. D. & SMITH, C. M. **The Chemical Nature of Copper-Arsenic Insecticides.** *J. Econom. Entom.* 1943, Dec., v. 36, No. 6, 941–2.

SHAKIRZIANOVA, M. S. [**The Biology of Phlebotomus in Kazakhstan.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1943, v. 12, No. 2, 52–6, 2 figs. [In Russian.]

WANSON, M. & HENRARD, C. Les simulies de Leopoldville : description d'espèces nouvelles. [**Simuliidae of Leopoldville : New Species.**] *East African Med. J.* 1944, Feb., v. 21, No. 2, 34–47, 14 figs. on 3 pls. [20 refs.]

JOYCE, C. R. & EDDY, G. W. **Host and Seasonal Notes on the Rabbit Tick,** *Haemaphysalis leporis-palustris. Iowa State Coll. J. Sci.* 1943, v. 17, No. 2, 205–12, 1 graph. [17 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Mar., v. 32, Pt. 3, 44.]

The observations recorded in this paper were made in 1941 in the course of work on ticks in an Indian reservation in Iowa, where *Haemaphysalis leporis-palustris*, Pack., constituted over 20 per cent. of all the ticks caught and was second in abundance to *Dermacentor variabilis*, Say. It transmits tularaemia and Rocky Mountain spotted fever among rabbits, its local host in the area under observation being *Sylvilagus floridanus mearnsi*, but does not readily attach itself to man. *D. variabilis*, which is a vector of both diseases to man, and *H. leporis-palustris* were taken in large numbers from the same rabbits. Ground-feeding birds were found to be common hosts of the immature forms of the latter tick, and a list is given of 29 species from which they were recovered; by far the greatest number was taken from the brown thrasher (*Toxostoma rufum*). *D. variabilis*, however, was not observed on birds. Other hosts from which larvae of *H. leporis-palustris* were taken, though in very small numbers, were ground hog (*Marmota monax*), cat, dog and opossum (*Didelphis*). The collections showed that the adults of *H. leporis-palustris* occurred on rabbits throughout the spring and summer, but became less numerous in August and disappeared after September. The immature forms were most abundant in June–August, but larvae and nymphs were commonly taken up to December. Activity ceased during December, and observations in 1942 showed that it was resumed in March and April.

Fourteen examples of the Encyrtid, *Ixodiphagus texanus*, How., emerged from a single engorged nymph of *H. leporis-palustris* taken from a brown thrasher on 24th April 1941.

WEINMAN, D. & BERNE, R. **Therapeutic Cure of Acute Experimental Toxoplasmosis in Animals.** *J. Amer. Med. Ass.* 1944, Jan. 1, v. 124, No. 1, 6–8.

In experimental toxoplasmosis of mice, which is usually fatal in about 15 days, subcutaneous administration of sulphapyridine suspended in cotton seed oil was able to effect an immediate cure in most of the animals, provided treatment was commenced at the end of the fifth day from inoculation. If treatment was deferred till after the tenth day, only half of the animals recovered. Similar results were obtained by administering solutions of sodium sulphapyridine intraperitoneally. During treatment the blood levels varied from 10·5 to 25·0 mgm. per 100 cc. of blood. The dosage was 0·01 gm. of sodium sulphapyridine, or 0·015 gm. of sulphapyridine in oil two or three times a day for six to nine days. Similar experiments were carried out with sulphadiazine, which also effected cures. The results with sulphathiazole were inconclusive on account of a low blood concentration. Though cures were effected, in no case was the infection completely eradicated, as all the mice tested retained virulent parasites in their brains. The authors consider that the results indicate that the use of sulphonamides might be extended to human toxoplasmosis.

C. M. Wenyon.

WEINMAN, D. **Effects of Gramicidin and Tyrocidine on Pathogenic Protozoa and a Spirochete.** *Proc. Soc. Exper. Biol. & Med.* 1943, Oct., v. 54, No. 1, 38–40.

The two substances, tyrocidine and gramicidin, isolated from cultures of *Bacillus brevis*, the former active against bacteria, regardless of their staining properties, and the latter against Gram-positive organisms only, have been tested by the author against cultures of protozoa and spirochaetes. Tyrocidine in concentrations of 5·0 gm. per cc. markedly inhibits growth of *Leishmania tropica*, *Trypanosoma cruzi* and *T. lewisi*, but not that of either *Leptospira icterohemorrhagiae* or *Bartonella bacilliformis*. It also killed *Trichomonas vaginalis* in cultures, and was effective in bringing about a temporary eradication of the flagellate *in vivo*. When relapse occurred, it was ineffective against the relapse flagellates. Gramicidin, in concentration of 1·0 gm., in conformity with its failure to affect Gram-negative bacteria, had no action on the Gram-negative protozoa, spirochaetes or bartonella.

C. M. Wenyon.

BOOK REVIEW.

HUFF, Clay G. [Professor of Parasitology, University of Chicago]. **A Manual of Medical Parasitology.** pp. x+88. With 10 plates (1 coloured) & 2 figs. 1943. Chicago, Ill.: University of Chicago Press, 5750 Ellis Avenue. [9*s*.]

The dictionary defines a manual as "a small book for handy use," and Professor Huff's work, which consists of some 80 pages of text (12 of which are occupied by illustrations), certainly comes within this definition. The size of the book, however, must not be taken as indicative of the scope of its contents, for the number of species of parasites described is very great—indeed a comparison with such standard works as CRAIG and FAUST or BELDING, works of 800–1,000 pages, shows that the present manual refers to nearly as many species as are dealt with in these two volumes of ten times the size. To give accounts of so many parasites in so small a space can only be achieved by omitting some important aspects of the subject, and Dr. Huff's manual is concerned with describing the recognition and pathogenic importance of the parasites, and omits, or only briefly refers to, their life-cycle and the methods used for their control. Indeed, it would appear to be the author's intention not so much to teach the student the biology of these parasites, as to draw his attention to their existence and to teach him a little about their importance and recognition—in short, not to make the student feel proud that he has learned so much, but rather to make him feel humble that he knows so little.

The first three chapters occupy some 28 pages and are concerned with the trematodes, cestodes and nematodes; a short description is given in each case of the general and specific characters of the adult, larva and egg, and mention is made of the intermediate host and the pathogenicity of the parasite. Chapters 4, 5 and 6 deal similarly with the intestinal

and blood-inhabiting protozoa, chapter 6 ending with a note by Dr. TALIAFERRO on the reactions of the human host to malaria—a masterpiece of condensation. Chapter 7 deals with the mosquitoes which transmit disease and the methods of distinguishing Anopheline and Culicine in their larval and adult stages, and concludes with a key intended for the identification of a few species, together with an admirable account of how to use it and some simple exercises. Chapter 8, to which a key is likewise provided, refers to the Ceratopogonidae, the Simuliidae, the Psychodidae and the Tabanidae, the genera *Glossina* and *Stomoxys*, and a number of non-biting flies of medical importance. In each case the pathogenic importance of the fly is described, but it is doubtful whether the descriptions and illustrations are sufficiently detailed to allow of identification. Chapters 9 and 10, which together occupy only seven pages, describe the fleas, lice, bugs, ticks and mites, the same general arrangement being observed as with the other Arthropods. Chapter 11 is the longest in the book and the information which it contains, although compressed, is surprisingly detailed; thus, under "Biopsy" are considered liver and splenic puncture, sternal puncture, gland puncture, muscle biopsy and skin biopsy. There is an excellent and comprehensive index. The book is strongly bound and well printed and the price (9*s*.) is certainly not excessive.

It is clear from his preface that Professor Huff does not imply that the teaching of parasitology and tropical medicine should come before, as opposed to after, graduation. What he does suggest—and with this most teachers of medical parasitology will agree—is that it is highly improper to let the medical student pass from the University to public life without giving him at least an outline of these subjects, so that he will later realize that there is a vast field of medicine concerning which he has no satisfactory knowledge. This suggestion at once raises the question of how extensive an outline should be given to the student before graduation. That some of it can be taught during his first courses of biology is certain, but the field at this stage is limited and the bulk of the work will devolve on the final years of teaching. We have already referred to the fact that Dr. Huff omits no parasite of importance in human disease, and an examination of the table of contents shows that the American student is supposed to be conversant with at least the names of 10 of the flukes, 12 of the cestodes, 15 of the roundworms, and no less than 25 of the protozoa, to say nothing of the insects and ticks concerned with their transmission; truly a formidable list. Whether the American medical student in his final years is really acquainted with these parasites we do not know; but we feel sure that the vast majority of the names mentioned mean little or nothing to the British medical student of the same standing, in spite of the fact that, once qualified, the British student is more likely to encounter the parasites and the diseases which they produce than is his American colleague.

The reviewer has dealt with this book in some detail because he is of opinion that it represents an important addition to the literature in that it is the first attempt to provide a manual of parasitology suitable for the medical student during his undergraduate career.

R. M. Gordon.

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
By the South Essex Recorders, Ltd., Ilford.

(588) Wt. P9/279 7/44 S.E.R. Ltd. Gp 432.

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